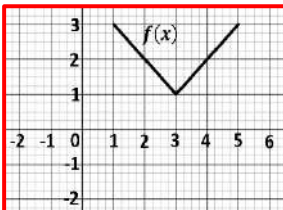
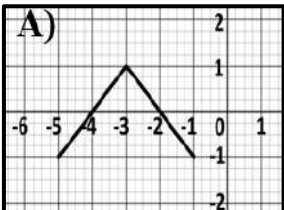
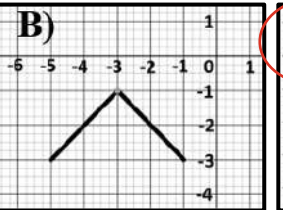
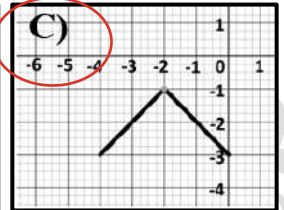
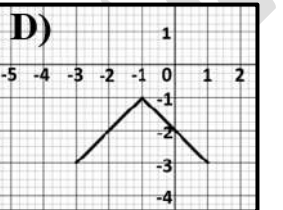


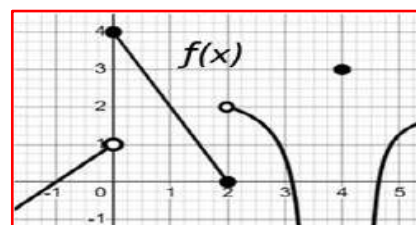
Choose the correct option two marks for each right answer .

- The range of which of the following functions is $[1, +\infty[$?
 A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x-1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$
- Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.
 A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$
- Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2-4}}$
 A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None
- Which the following equation is symmetric with respect to the y-axis?
 A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2-x}{\tan x}$
- What is the domain of the function $f(x) = \frac{5}{|x+4|}$
 A) $]-\infty, +\infty[$ B) $]-4, +\infty[$ C) $]-\infty, -4[\cup]-4, +\infty[$ D) $]0, +\infty[$
- Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$
 A) $(3, 2)$ B) $(-3, 0)$ C) $(1, 2)$ D) $(0, 4)$
- If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
 A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$
- Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x-1))$





- If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?
 A) $-3x(x+1)$ B) $(x+1)^2$ C) $-(x+1)$ D) $3(x+1)$
- If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$
 A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$
- Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$

12. Use the given graph on the right, to find the result of

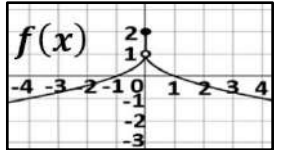
$$\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$$

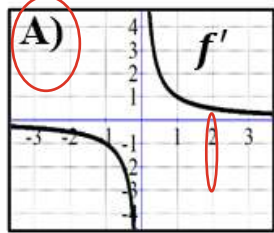
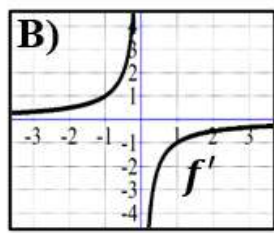
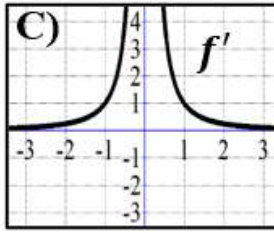
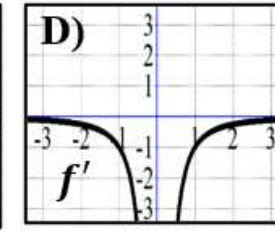
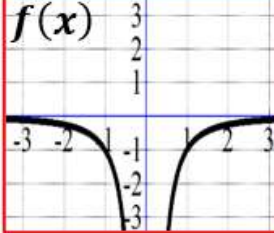
- A) 7 B) 3
 C) 5 D) 1

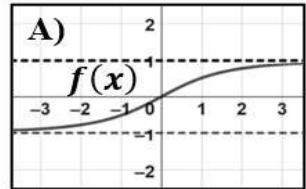
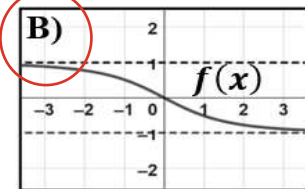
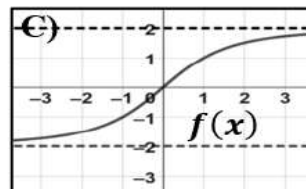
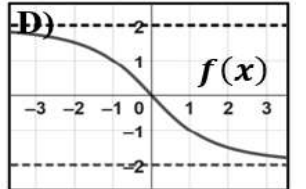


- Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2
- which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$ SN: 000001
 A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3} f(x) = -\infty$
- Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$
 A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$
- Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$
 A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1-\cos x}$
- Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$
 A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$
- Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

 A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$
- If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$
 A) 0 B) 2 C) 4 D) -1
- Use the given graph on the right, Which of the following is true ?
 A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
 C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$

- Which of the following function is differentiable at $x = 0$
 A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$
- If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$
 A) 2 B) 1 C) 0 D) 4
- Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.
 A) $(0, 1)$ B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$
- Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$
 A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$
- Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)
 A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist
- Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$

27. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$
 A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) **-1**
28. In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?
 A) 100 m B) 150 m C) 96 m D) **125 m**
29. Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
 A) **$\frac{dy}{dt} = -1$** B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$
30. If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$ Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
 A) -27 B) -18 C) **-12** D) 36
31. Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) **$x = 1$**
32. Which function has exactly one local extrema?
 A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) **$f(x) = |x - 2|$** D) $f(x) = x^3 - 12x$
33. The decreasing interval of the function $f(x) = 4 - |x - 3|$ is:
 A) $]4, +\infty[$ B) **$]3, +\infty[$** C) $] -\infty, 4[$ D) $] -\infty, 3[$
34. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$
 A) $y = 3$ B) **$y = -2$** C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$
35. Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$
 A) $]0, \frac{\pi}{2}[$ B) **$]\frac{\pi}{2}, \frac{3\pi}{2}[$** C) $]\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$
36. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?
- 




37. Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x+1}}{\sqrt{x+5}}$
 A) **$+\infty$** B) $\frac{1}{5}$ C) 1 D) 0
38. Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) **(1, 1)** B) (0, 0) C) (2, 4) D) $(\frac{1}{2}, \frac{1}{4})$
39. Which of the following function the inflection point is (0,0)?
 A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) **$f(x) = \sqrt[3]{x}$** D) $f(x) = x^4$

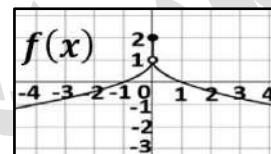
40. Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$
- 



41. Which of the following is true?
 A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) **$\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$** D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$
42. Find the value of $f(0)$ If $f'(x) = 2\sin x + 3\cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$
 A) 1 B) -1 C) **-3** D) 5
43. The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is:
 A) $\sqrt[3]{3x} + c$ B) **$\sqrt[3]{(3x)^2} + c$** C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$
44. A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck?
 A) 45 m/s B) 128 m/s C) 60 m/s D) **32 m/s**
45. Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$
 A) 27 B) 28 C) **30** D) 31
46. If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$
 A) **-4** B) 4 C) 2 D) -2
47. The result of $\int_{-1}^1 (1 - |x|) dx$ is:
 A) 3 B) 0 C) **1** D) 2
48. Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$
 A) $\frac{8}{3}$ B) 4 C) 16 D) **$\frac{5}{3}$**
49. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?
 A) $c = 2$ B) $c = -3$ C) $c = 0$ D) **$c = -2$**
50. The result of $\int 2x \sin x dx$ is:
 A) **$2\sin x - 2x \cos x + c$** B) $2\cos x - 2x \sin x + c$
 C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

Choose the correct option two marks for each right answer .

- The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
 A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$
- If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
 A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$
- In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?
 A) 100 m B) 150 m C) 96 m D) 125 m
- Which function has exactly one local extrema ?
 A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$
- Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
- If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x + 1)$?
 A) $-3x(x + 1)$ B) $(x + 1)^2$ C) $-(x + 1)$ D) $3(x + 1)$
- The range of which of the following functions is $[1, +\infty[$?
 A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x - 1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$
- Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
- Use the given graph on the right, Which of the following is true ?
 A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
 C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$
- The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :
 A) $]4, +\infty[$ B) $]3, +\infty[$ C) $]-\infty, 4[$ D) $]-\infty, 3[$
- Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
 A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$
- Determine the value of a and b such that the function is continuous everywhere.

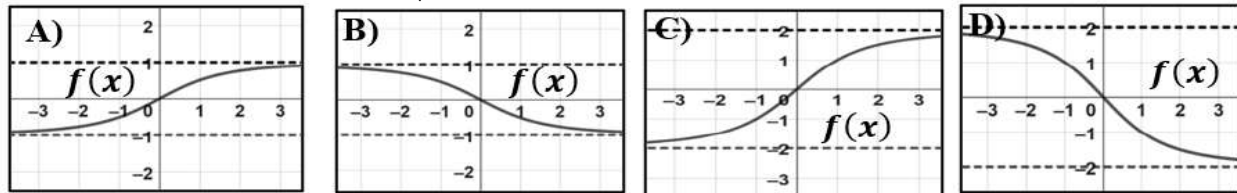
$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

 A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$
- What is the domain of the function $f(x) = \frac{5}{|x+4|}$
 A) $] -\infty, +\infty[$ B) $] -4, +\infty[$ C) $] -\infty, -4[\cup] -4, +\infty[$ D) $] 0, +\infty[$



- Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$
 A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$
- Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$
 A) $]0, \frac{\pi}{2}[$ B) $[\frac{\pi}{2}, \frac{3\pi}{2}]$ C) $[\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$
- If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$
 A) -4 B) 4 C) 2 D) -2
- Which the following equation is symmetric with respect to the y-axis?
 A) $x^2 y + x = x^3 y$ B) $x^2 + y = x^4 y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$
- Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$
 A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$
- Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x - 1))$
- Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) (1, 1) B) (0, 0) C) (2, 4) D) $(\frac{1}{2}, \frac{1}{4})$
- Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0, x = 3$
 A) 27 B) 28 C) 30 D) 31
- Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2 - 3x + 2}{x^2 - 2x}$ B) $f(x) = \frac{x^2 - x - 6}{x^2 + 2x}$ C) $f(x) = \frac{x^2 - 3x + 2}{x^2 + 2x}$ D) $f(x) = \frac{x^2 - x - 6}{x^2 - 2x}$
- Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$
 A) 1 B) -1 C) -3 D) 5
- If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$
 A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$
- which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2 - 6x + 9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
- A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?
 A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s

27. Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$



28. Which of the following is true ?

A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$

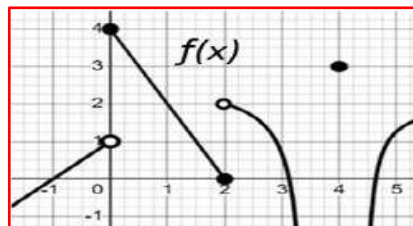
29. The result of $\int 2x \sin x dx$ is :

A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

30. Use the given graph on the right, to find the result of

$$\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$$

A) 7 B) 3
C) 5 D) 1



31. Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$

A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$

32. Which of the following function the inflection point is (0,0) ?

A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$

33. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2-4}}$

A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None

34. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$

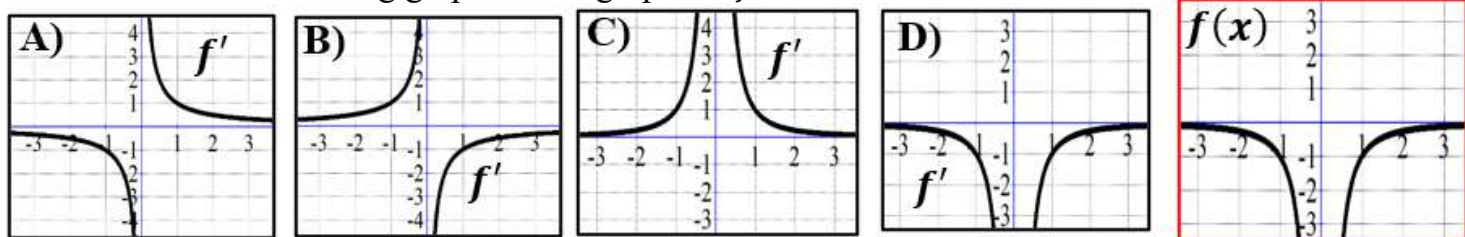
A) 2 B) 1 C) 0 D) 4

35. If f and g are two differentiable functions and $h = gof$ then find the result of $h'(-1)$

Knowing that $\lim_{x \rightarrow -2} \frac{g(x)-g(-2)}{x+2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$

A) -27 B) -18 C) -12 D) 36

36. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?



37. The result of $\int_{-1}^1 (1 - |x|) dx$ is :

A) 3 B) 0 C) 1 D) 2

38. Which the following point on the line with the slope is undefined and passes through the point $(-3,4)$

A) (3,2) B) $(-3,0)$ C) (1,2) D) (0,4)

39. Which of the following function is differentiable at $x = 0$

A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$

40. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?

A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$

41. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2,0)$

A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1

42. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$

A) 0 B) 2 C) 4 D) -1

43. Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$

A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$

44. Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.

A) (0, 1) B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$

45. Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$

A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2

46. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2-2x^3}{x^3+x^2-1}$

A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$

47. Find the equation of the line that passes through the point $(-1,3)$ and that is parallel to the x-axis.

A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$

48. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)

A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist

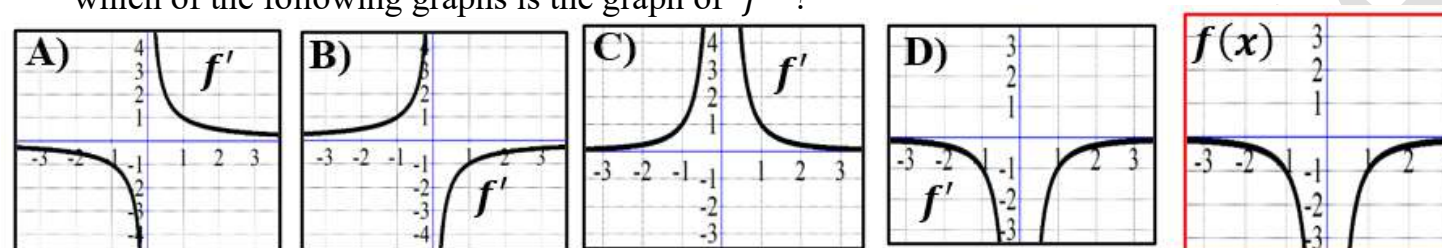
49. Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$

A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$

50. Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x} + 1}{\sqrt{x} + 5}$

A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0

Choose the correct option two marks for each right answer .

- Find the value of $f(0)$ If $f'(x) = 2\sin x + 3\cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$
 A) 1 B) -1 C) -3 D) 5
- Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$
 A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1-\cos x}$
- Which the following equation is symmetric with respect to the y-axis?
 A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$
- Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2 - 3x + 2}{x^2 - 2x}$ B) $f(x) = \frac{x^2 - x - 6}{x^2 + 2x}$ C) $f(x) = \frac{x^2 - 3x + 2}{x^2 + 2x}$ D) $f(x) = \frac{x^2 - x - 6}{x^2 - 2x}$
- Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) (1, 1) B) (0, 0) C) (2, 4) D) $(\frac{1}{2}, \frac{1}{4})$
- If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$
 A) 2 B) 1 C) 0 D) 4
- The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?

- Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
 A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$
- Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$
 A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$
- If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$
 A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$
- Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2 - 4}}$
 A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None

12. The result of $\int 2x \sin x dx$ is :

- A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
 C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

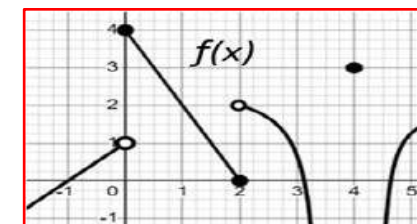
13. In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?

- A) 100 m B) 150 m C) 96 m D) 125 m

14. Use the given graph on the right, to find the result of

$$\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$$

- A) 7 B) 3
 C) 5 D) 1



15. What is the domain of the function $f(x) = \frac{5}{|x+4|}$

- A) $]-\infty, +\infty[$ B) $]-4, +\infty[$ C) $]-\infty, -4[\cup]-4, +\infty[$ D) $]0, +\infty[$

16. Which function has exactly one local extrema ?

- A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$

17. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)

- A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist

18. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$

- A) 0 B) 2 C) 4 D) -1

19. The range of which of the following functions is $[1, +\infty[$?

- A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x-1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$

20. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?

- A) $-3x(x+1)$ B) $(x+1)^2$ C) $-(x+1)$ D) $3(x+1)$

21. Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$

- A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$

22. Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.

- A) (0, 1) B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$

23. If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$

- A) -4 B) 4 C) 2 D) -2

24. Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$

- A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$

25. Which of the following function the inflection point is (0,0) ?

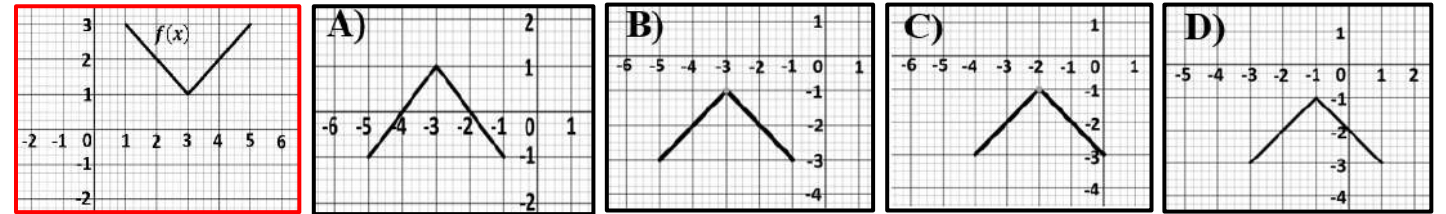
- A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$

26. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?

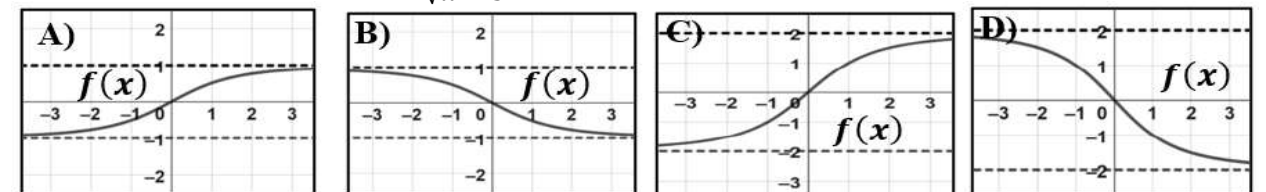
- A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$

27. Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x+1}}{\sqrt{x+5}}$
- A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0
28. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$
- A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = -\frac{2}{3}$
29. Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$
- A) 27 B) 28 C) 30 D) 31
30. Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$
- A) $(3, 2)$ B) $(-3, 0)$ C) $(1, 2)$ D) $(0, 4)$
31. Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
- A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2
32. If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$ Knowing that $\lim_{x \rightarrow -2} \frac{g(x)-g(-2)}{x+2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
- A) -27 B) -18 C) -12 D) 36
33. Which of the following function is differentiable at $x = 0$
- A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$
34. The result of $\int_{-1}^1 (1 - |x|) dx$ is :
- A) 3 B) 0 C) 1 D) 2
35. which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$
- A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
36. A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?
- A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s
37. The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :
- A) $]4, +\infty[$ B) $]3, +\infty[$ C) $] -\infty, 4[$ D) $] -\infty, 3[$
38. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$
- A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1
39. Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$
- A) $]0, \frac{\pi}{2}[$ B) $[\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $[\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$
40. Which of the following is true ?
- A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$

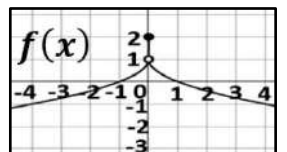
41. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x-1))$



42. Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
- A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
43. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.
- A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$
44. Find the critical value of the function $f(x) = xe^{-x}$
- A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
45. The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
- A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$
46. Determine the value of a and b such that the function is continuous everywhere.
- $$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$
- A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$
47. Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$



48. Use the given graph on the right, Which of the following is true ?
- A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$



49. Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$
- A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$
50. If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
- A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$

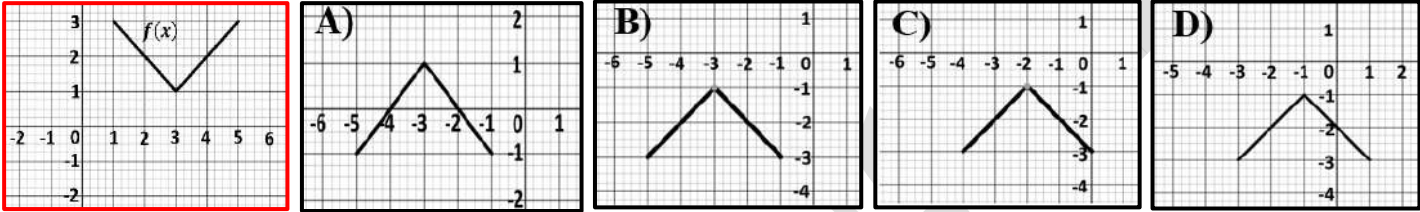
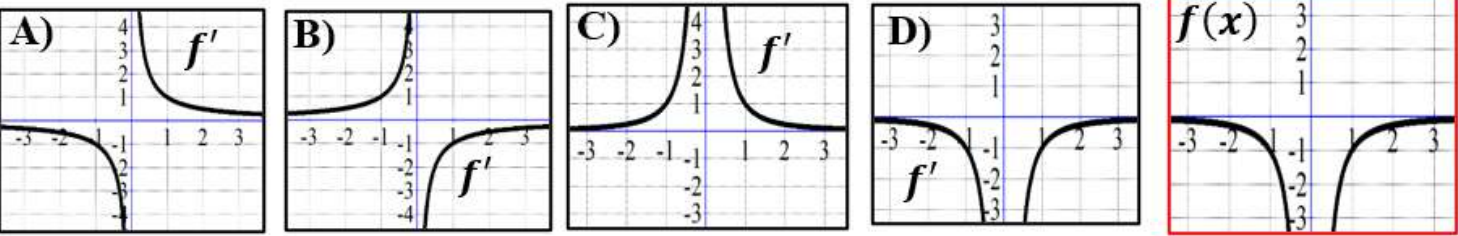
Choose the correct option two marks for each right answer .

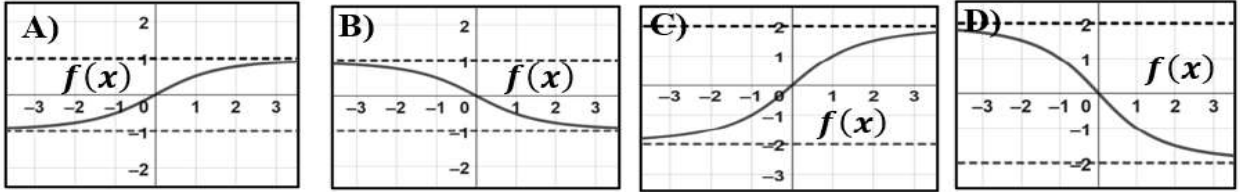
- Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.
 A) $(0, 1)$ B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$
 - Which of the following is true ?
 A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$
 - Use the given graph on the right, Which of the following is true ?
 A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
 C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$
-
- Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$
 A) 27 B) 28 C) 30 D) 31
 - Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)
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 - A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?
 A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s
 - Find the result of $\lim_{x \rightarrow +\infty} \frac{x+\sqrt{x}+1}{\sqrt{x}+5}$
 A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0
 - The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :
 A) $] 4, +\infty [$ B) $] 3, +\infty [$ C) $] -\infty, 4 [$ D) $] -\infty, 3 [$
 - If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$
 A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$
 - Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{x}}{x}$
 A) $\frac{2}{9}$ B) $\frac{-2}{9}$ C) $\frac{2}{3}$ D) $\frac{-2}{3}$
 - Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$
 A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$
 - The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
 A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$
 - Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$

- If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?
 A) $-3x(x+1)$ B) $(x+1)^2$ C) $-(x+1)$ D) $3(x+1)$
 - If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?
 A) $c = 2$ B) $c = -\frac{5}{3}$ C) $c = 0$ D) $c = -2$
 - Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.
 A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$
 - Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$
 A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$
 - If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$
 A) 2 B) 1 C) 0 D) 4
 - Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$
 A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$
 - If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
 A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$
 - which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2 - 6x + 9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
 - What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$
 A) $\frac{1}{4}$ B) $\frac{-1}{4}$ C) 1 D) -1
 - Which of the following function is differentiable at $x = 0$
 A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$
 - Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2 - 3x + 2}{x^2 - 2x}$ B) $f(x) = \frac{x^2 - x - 6}{x^2 + 2x}$ C) $f(x) = \frac{x^2 - 3x + 2}{x^2 + 2x}$ D) $f(x) = \frac{x^2 - x - 6}{x^2 - 2x}$
 - Use the given graph on the right, to find the result of
 $\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$
 A) 7 B) 3
 C) 5 D) 1
-
- Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

 A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$
 - Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2 - 4}}$
 A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None

28. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$
 A) 0 B) 2 C) 4 D) -1
29. Which function has exactly one local extrema?
 A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$
30. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$
 A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$
31. Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$
 A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$
32. If f and g are two differentiable functions and $h = gof$ then find the result of $h'(-1)$
 Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
 A) -27 B) -18 C) -12 D) 36
33. Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
 A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$
34. Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$
 A) $(3, 2)$ B) $(-3, 0)$ C) $(1, 2)$ D) $(0, 4)$
35. Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$
 A) 1 B) -1 C) -3 D) 5
36. Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
37. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x - 1))$
- 
38. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?
- 
39. What is the domain of the function $f(x) = \frac{5}{|x+4|}$
 A) $]-\infty, +\infty[$ B) $]-4, +\infty[$ C) $]-\infty, -4[\cup]-4, +\infty[$ D) $]0, +\infty[$

40. Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$
 A) $]0, \frac{\pi}{2}[$ B) $]\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $]\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$
41. Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2
42. The result of $\int_{-1}^1 (1 - |x|) dx$ is :
 A) 3 B) 0 C) 1 D) 2
43. The range of which of the following functions is $[1, +\infty[$?
 A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x - 1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$
44. Which the following equation is symmetric with respect to the y-axis?
 A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$
45. Which of the following function the inflection point is $(0, 0)$?
 A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$
46. If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$
 A) -4 B) 4 C) 2 D) -2
47. In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?
 A) 100 m B) 150 m C) 96 m D) 125 m
48. Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$
- 
49. The result of $\int 2x \sin x dx$ is :
 A) $2 \sin x - 2x \cos x + c$ B) $2 \cos x - 2x \sin x + c$
 C) $2 \cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$
50. Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) $(1, 1)$ B) $(0, 0)$ C) $(2, 4)$ D) $(\frac{1}{2}, \frac{1}{4})$

Choose the correct option two marks for each right answer .

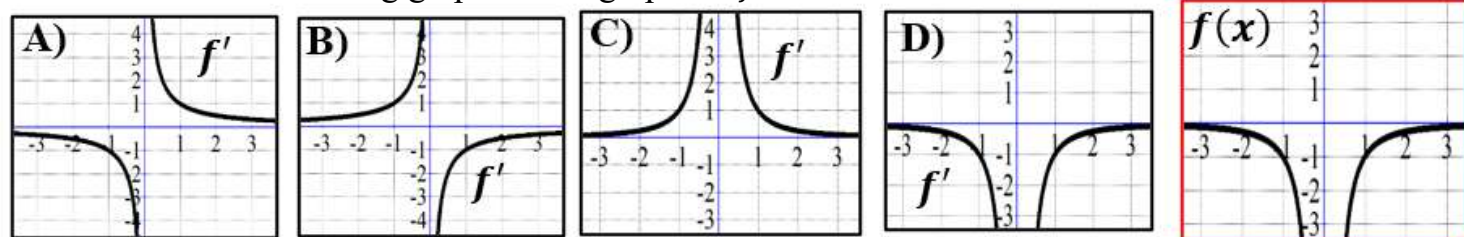
1. Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$

- A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$

2. Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$

- A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$

3. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?



4. A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 . At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck?

- A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s

5. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2-4}}$

- A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None

6. Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$

- A) $]0, \frac{\pi}{2}[$ B) $[\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $[\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup [\frac{\pi}{2}, \frac{3\pi}{2}[$

7. Which the following equation is symmetric with respect to the y-axis?

- A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2-x}{\tan x}$

8. If $\int_1^2 f(x)dx = 6$ and $\int_2^4 f(x)dx = -4$ then find the value of $2 \int_4^1 f(x)dx$

- A) -4 B) 4 C) 2 D) -2

9. Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$

- A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$

10. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$

- A) 0 B) 2 C) 4 D) -1

11. Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$

- A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2

12. Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

- A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$

13. Find the critical value of the function $f(x) = xe^{-x}$

- A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$

14. which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$

- A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$

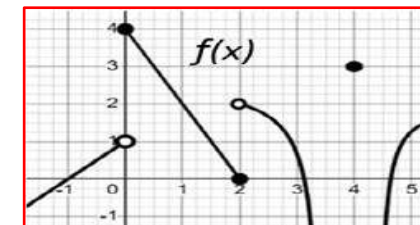
15. The result of $\int 2x \sin x dx$ is :

- A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
 C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

16. Use the given graph on the right, to find the result of

$$\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$$

- A) 7 B) 3
 C) 5 D) 1



17. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$

- A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1

18. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$

- A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1-\cos x}$

19. In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?

- A) 100 m B) 150 m C) 96 m D) 125 m

20. Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$

- A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$

21. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$

- A) 2 B) 1 C) 0 D) 4

22. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?

- A) $-3x(x+1)$ B) $(x+1)^2$ C) $-(x+1)$ D) $3(x+1)$

23. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)

- A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist

24. Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$

where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$

- A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$

25. Which of the following is true ?

A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$

26. The range of which of the following functions is $[1, +\infty[$?

A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x-1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$

27. Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.

A) $(0, 1)$ B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$

28. Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$

A) 27 B) 28 C) 30 D) 31

29. Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$

A) $(3, 2)$ B) $(-3, 0)$ C) $(1, 2)$ D) $(0, 4)$

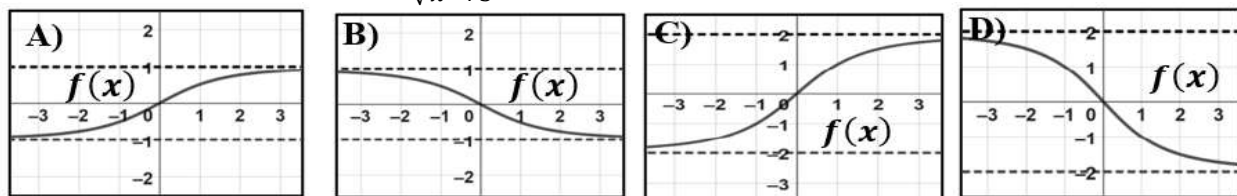
30. Which of the following function the inflection point is $(0, 0)$?

A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$

31. The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :

A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$

32. Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$



33. The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :

A) $] 4, +\infty [$ B) $] 3, +\infty [$ C) $] -\infty, 4 [$ D) $] -\infty, 3 [$

34. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?

A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$

35. Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x} + 1}{\sqrt{x} + 5}$

A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0

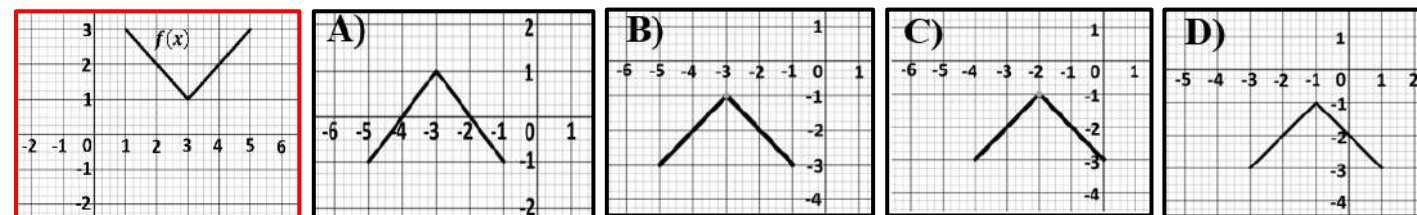
36. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.

A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$

37. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$

A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$

38. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x - 1))$



39. Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$

A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$

40. Which of the following function is differentiable at $x = 0$

A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$

41. Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$

A) $(1, 1)$ B) $(0, 0)$ C) $(2, 4)$ D) $(\frac{1}{2}, \frac{1}{4})$

42. Which function has exactly one local extrema ?

A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$

43. What is the domain of the function $f(x) = \frac{5}{|x+4|}$

A) $] -\infty, +\infty [$ B) $] -4, +\infty [$ C) $] -\infty, -4[\cup] -4, +\infty [$ D) $] 0, +\infty [$

44. If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$

A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$

45. Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$

A) 1 B) -1 C) -3 D) 5

46. If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :

A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$

47. If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$

Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$

A) -27 B) -18 C) -12 D) 36

48. Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$

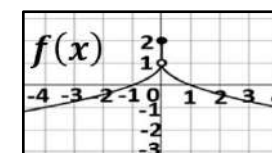
A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$

49. The result of $\int_{-1}^1 (1 - |x|) dx$ is :

A) 3 B) 0 C) 1 D) 2

50. Use the given graph on the right, Which of the following is true ?

A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$

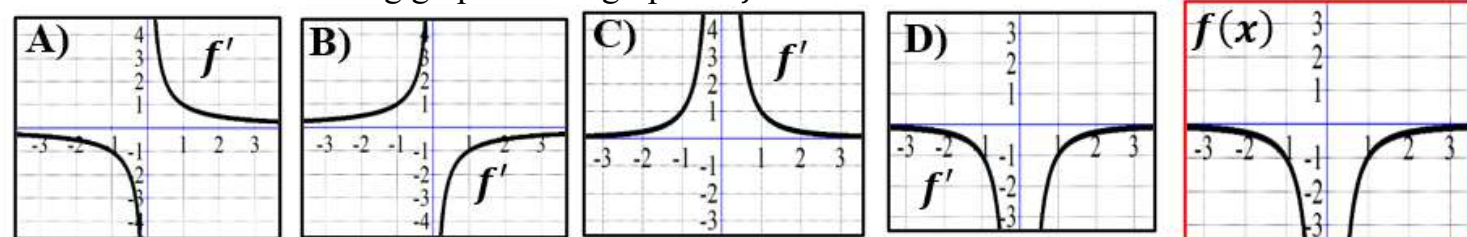
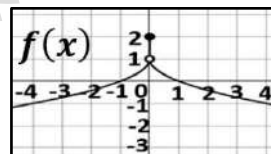


Choose the correct option two marks for each right answer .

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$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

 A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$
- Which of the following is true ?
 A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$
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 A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s
- Which of the following function is differentiable at $x = 0$
 A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$
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 A) $] 4, +\infty [$ B) $] 3, +\infty [$ C) $] -\infty, 4 [$ D) $] -\infty, 3 [$
- Use the given graph on the right, Which of the following is true ?
 A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
 C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$

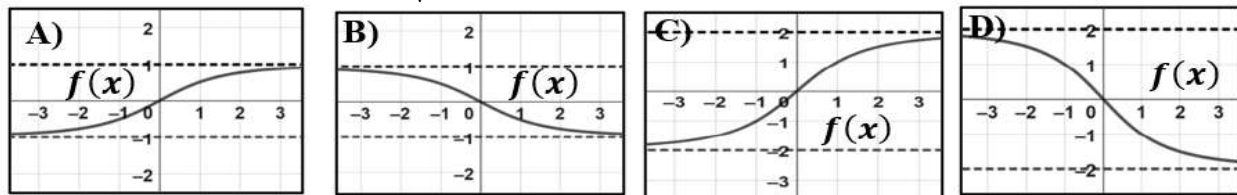


- which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
- Find the result of $\lim_{x \rightarrow +\infty} \frac{x+\sqrt{x}+1}{\sqrt{x}+5}$ SN: 000006
 A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0
- Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
- The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
 A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$
- Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.
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- What is the domain of the function $f(x) = \frac{5}{|x+4|}$
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- Which function has exactly one local extrema ?
 A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$
- Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2
- Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$
 A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$
- If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
 A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$

27. The range of which of the following functions is $[1, +\infty[$?

- A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x-1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$

28. Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$



29. Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$

- A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$

30. Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$

- A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$

31. Which the following point on the line with the slope is undefined and passes through the point $(-3,4)$

- A) $(3,2)$ B) $(-3,0)$ C) $(1,2)$ D) $(0,4)$

32. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)

- A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist

33. If $\int_1^2 f(x)dx = 6$ and $\int_2^4 f(x)dx = -4$ then find the value of $2 \int_4^1 f(x)dx$

- A) -4 B) 4 C) 2 D) -2

34. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2-4}}$

- A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None

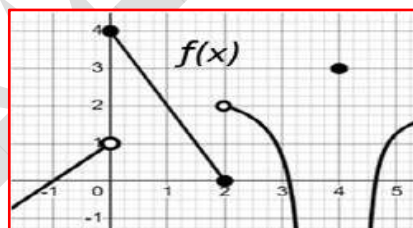
35. The result of $\int 2x \sin x dx$ is :

- A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

36. Use the given graph on the right, to find the result of

$$\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$$

- A) 7 B) 3
C) 5 D) 1



37. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?

- A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$

38. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2-2x^3}{x^3+x^2-1}$

- A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$

39. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2,0)$

- A) $\frac{1}{4}$ B) $\frac{-1}{4}$ C) 1 D) -1

40. Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$

- A) $]0, \frac{\pi}{2}[$ B) $[\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $[\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$

41. Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$

- A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$

42. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$

- A) 2 B) 1 C) 0 D) 4

43. If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$

- A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$

44. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?

- A) $-3x(x+1)$ B) $(x+1)^2$ C) $-(x+1)$ D) $3(x+1)$

45. Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$

- A) 1 B) -1 C) -3 D) 5

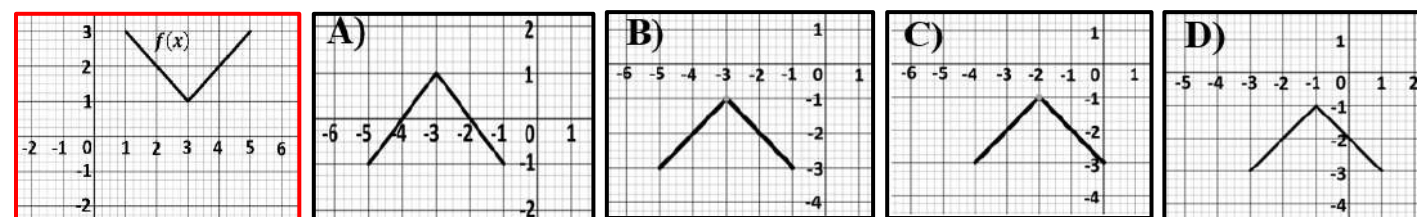
46. The result of $\int_{-1}^1 (1 - |x|)dx$ is :

- A) 3 B) 0 C) 1 D) 2

47. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$

- A) 0 B) 2 C) 4 D) -1

48. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x-1))$



49. Which of the following function the inflection point is $(0,0)$?

- A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$

50. Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$

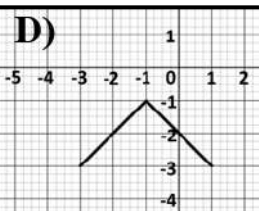
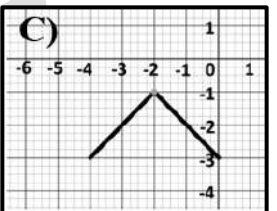
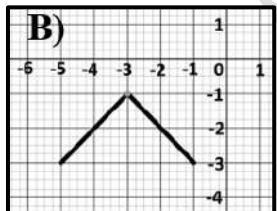
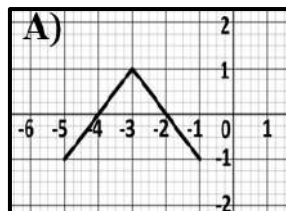
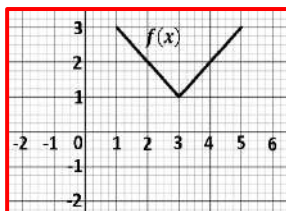
- A) $\frac{2}{9}$ B) $\frac{-2}{9}$ C) $\frac{2}{3}$ D) $\frac{-2}{3}$

Choose the correct option two marks for each right answer .

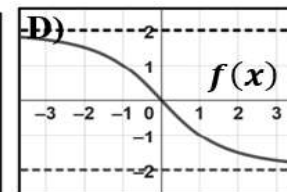
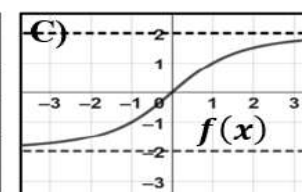
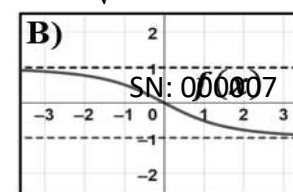
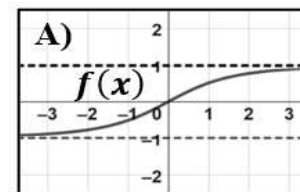
- Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2
- Use the given graph on the right, Which of the following is true ?
 A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
 C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$
- If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$
 A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$
- Which of the following is true ?
 A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$
- In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?
 A) 100 m B) 150 m C) 96 m D) 125 m
- The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :
 A) $]4, +\infty[$ B) $]3, +\infty[$ C) $] -\infty, 4[$ D) $] -\infty, 3[$
- If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$
 Knowing that $\lim_{x \rightarrow -2} \frac{g(x)-g(-2)}{x+2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
 A) -27 B) -18 C) -12 D) 36
- Which of the following function the inflection point is (0,0) ?
 A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$
- Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

 A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$
- Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x-1))$



- Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$



- A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 . At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?
 A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s
- Which function has exactly one local extrema ?
 A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$
- If $\int_1^2 f(x)dx = 6$ and $\int_2^4 f(x)dx = -4$ then find the value of $2 \int_4^1 f(x)dx$
 A) -4 B) 4 C) 2 D) -2
- Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$
 A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$
- Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
 A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$
- which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non-removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
- Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$
 A) $]0, \frac{\pi}{2}[$ B) $[\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $[\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$
- Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
- Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$
- Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
- Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)
 A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist
- The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
 A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$

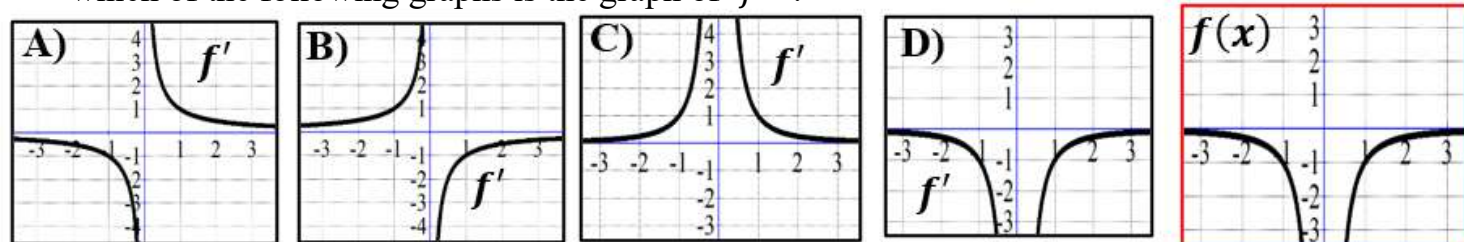
24. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$

- A) 2 B) 1 C) 0 D) 4

25. Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$

- A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$

26. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?



27. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2-4}}$

- A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None

28. Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$

- A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$

29. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.

- A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$

30. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?

- A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$

31. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$

- A) 0 B) 2 C) 4 D) -1

32. Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$

- A) $(1, 1)$ B) $(0, 0)$ C) $(2, 4)$ D) $(\frac{1}{2}, \frac{1}{4})$

33. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$

- A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1

34. Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.

- A) $(0, 1)$ B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$

35. Which the following equation is symmetric with respect to the y-axis?

- A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$

36. Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$

- A) 1 B) -1 C) -3 D) 5

37. The range of which of the following functions is $[1, +\infty[$?

- A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x - 1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$

38. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$

- A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$

39. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$

- A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$

40. What is the domain of the function $f(x) = \frac{5}{|x+4|}$

- A) $] -\infty, +\infty[$ B) $] -4, +\infty[$ C) $] -\infty, -4[\cup] -4, +\infty[$ D) $] 0, +\infty[$

41. The result of $\int 2x \sin x dx$ is :

- A) $2 \sin x - 2x \cos x + c$ B) $2 \cos x - 2x \sin x + c$
C) $2 \cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

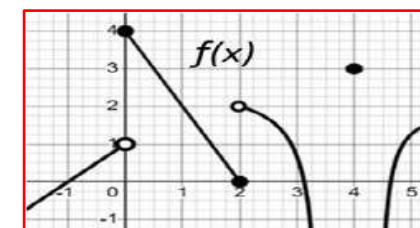
42. If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :

- A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$

43. Use the given graph on the right, to find the result of

$$\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$$

- A) 7 B) 3
C) 5 D) 1



44. The result of $\int_{-1}^1 (1 - |x|) dx$ is :

- A) 3 B) 0 C) 1 D) 2

45. Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x} + 1}{\sqrt{x} + 5}$

- A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0

46. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x + 1)$?

- A) $-3x(x + 1)$ B) $(x + 1)^2$ C) $-(x + 1)$ D) $3(x + 1)$

47. Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$

- A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$

48. Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$

- A) 27 B) 28 C) 30 D) 31

49. Which of the following function is differentiable at $x = 0$

- A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$

50. Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$

- A) $(3, 2)$ B) $(-3, 0)$ C) $(1, 2)$ D) $(0, 4)$

Choose the correct option two marks for each right answer .

- Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$
 A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$
- Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$
 A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$
- which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2 - 6x + 9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
- What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$
 A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1
- Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)
 A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist
- Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
- The result of $\int_{-1}^1 (1 - |x|) dx$ is :
 A) 3 B) 0 C) 1 D) 2
- Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
- What is the domain of the function $f(x) = \frac{5}{|x+4|}$
 A) $]-\infty, +\infty[$ B) $]-4, +\infty[$ C) $]-\infty, -4[\cup]-4, +\infty[$ D) $]0, +\infty[$
- Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2
- Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$
- Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$
 A) (3, 2) B) (-3, 0) C) (1, 2) D) (0, 4)
- If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$
 A) 0 B) 2 C) 4 D) -1

14. The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :

- A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$

15. If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$

- A) -4 B) 4 C) 2 D) -2

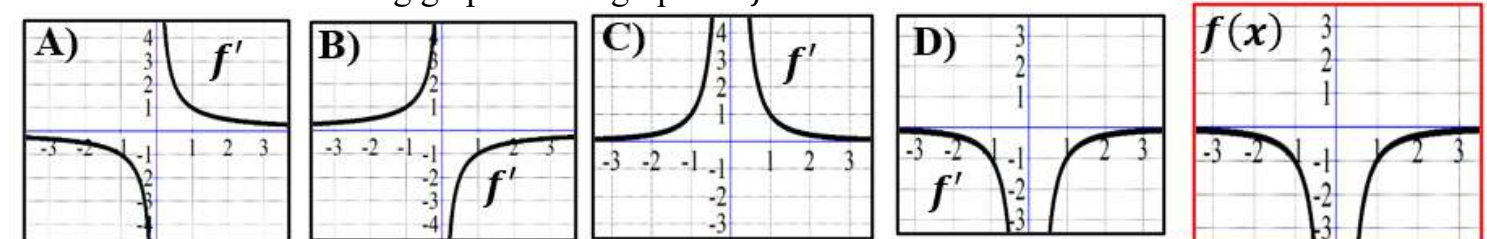
16. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.

- A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$

17. Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.

- A) (0, 1) B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$

18. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?



19. The range of which of the following functions is $[1, +\infty[$?

- A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x-1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$

20. The result of $\int 2x \sin x dx$ is :

- A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
 C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

21. Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$

- A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$

22. Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$

- A) (1, 1) B) (0, 0) C) (2, 4) D) $(\frac{1}{2}, \frac{1}{4})$

23. Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x} + 1}{\sqrt{x} + 5}$

- A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0

24. If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$

Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$

- A) -27 B) -18 C) -12 D) 36

25. Which of the following function is differentiable at $x = 0$

- A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$

26. If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$

- A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$

27. Which of the following is true ?

A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$

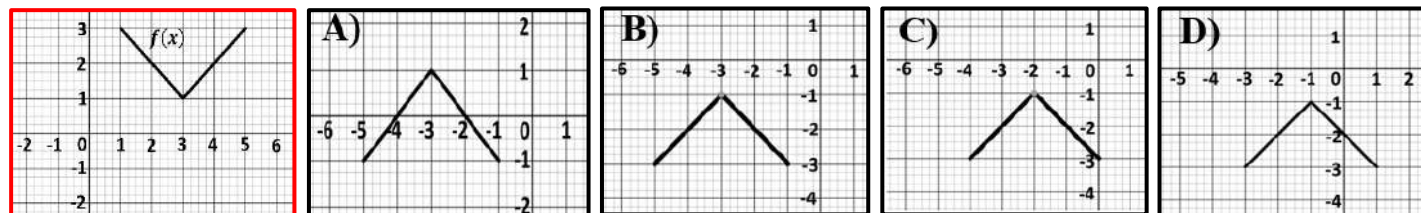
28. Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$

A) 27 B) 28 C) 30 D) 31

29. Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$

A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$

30. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x-1))$



31. Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$

A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$

32. Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$

A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$

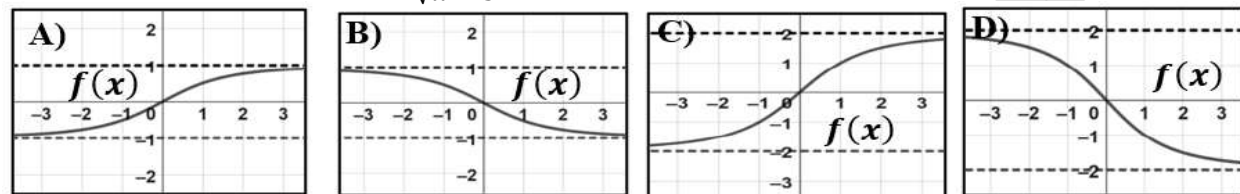
33. If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :

A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$

34. In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?

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35. Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$

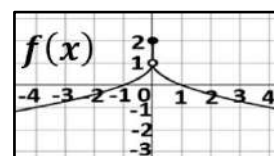


36. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?

A) $-3x(x+1)$ B) $(x+1)^2$ C) $-(x+1)$ D) $3(x+1)$

37. Use the given graph on the right, Which of the following is true ?

A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$



38. Which function has exactly one local extrema ?

A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$

39. Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$

A) 1 B) -1 C) -3 D) 5

40. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?

A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$

41. Which of the following equation is symmetric with respect to the y-axis?

A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$

42. Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$

A) $]0, \frac{\pi}{2}[$ B) $[\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $[\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$

43. Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$

44. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2-4}}$

A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None

45. Which of the following function the inflection point is $(0,0)$?

A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$

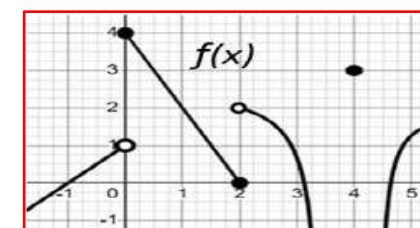
46. The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :

A) $]4, +\infty[$ B) $]3, +\infty[$ C) $] -\infty, 4[$ D) $] -\infty, 3[$

47. Use the given graph on the right, to find the result of

$$\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$$

A) 7 B) 3
C) 5 D) 1



48. A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 . At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?

A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s

49. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$

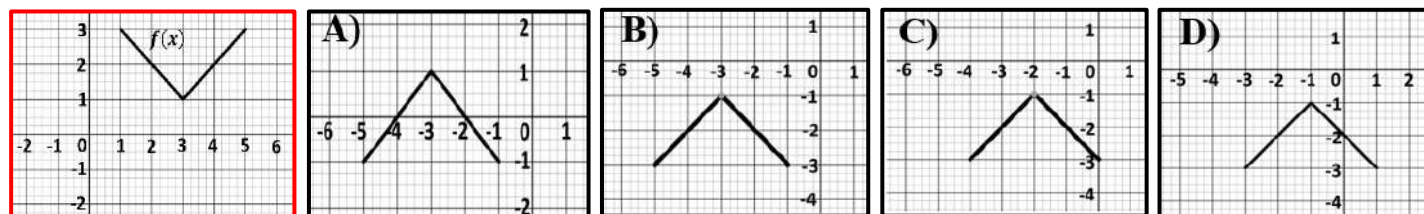
A) 2 B) 1 C) 0 D) 4

50. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$

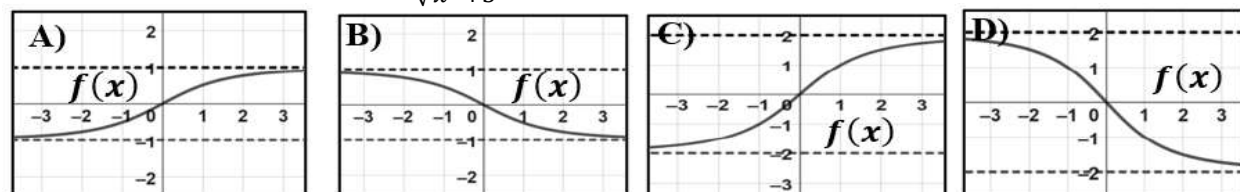
A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$

Choose the correct option two marks for each right answer .

- Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
- What is the domain of the function $f(x) = \frac{5}{|x+4|}$
 A) $]-\infty, +\infty[$ B) $]-4, +\infty[$ C) $]-\infty, -4[\cup]-4, +\infty[$ D) $]0, +\infty[$
- The range of which of the following functions is $[1, +\infty[$?
 A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x-1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$
- Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.
 A) $(0, 1)$ B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$
- Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x-1))$



- Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$
 A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$
- Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$
- The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
 A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$
- If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
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- Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$



- Which of the following is true ?

A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$

- Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$ SN: 000009

A) $(3, 2)$ B) $(-3, 0)$ C) $(1, 2)$ D) $(0, 4)$

- Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$

A) 27 B) 28 C) 30 D) 31

- Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$

A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$

- Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$

A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2

- Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$

A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$

- Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$

A) $(1, 1)$ B) $(0, 0)$ C) $(2, 4)$ D) $(\frac{1}{2}, \frac{1}{4})$

- The result of $\int_{-1}^1 (1 - |x|) dx$ is :

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- Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$

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- If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$

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 C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

- If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$

A) 0 B) 2 C) 4 D) -1

- Which function has exactly one local extrema ?

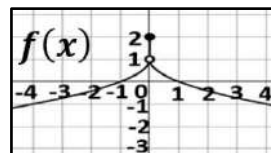
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- Which the following equation is symmetric with respect to the y-axis?

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27. Use the given graph on the right, Which of the following is true ?

- A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$



28. Which of the following function is differentiable at $x = 0$

- A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$

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- A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$

30. Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$

- A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$

31. The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :

- A) $] 4, +\infty [$ B) $] 3, +\infty [$ C) $] -\infty, 4 [$ D) $] -\infty, 3 [$

32. Which of the following function the inflection point is $(0,0)$?

- A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$

33. which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$

- A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$

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$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

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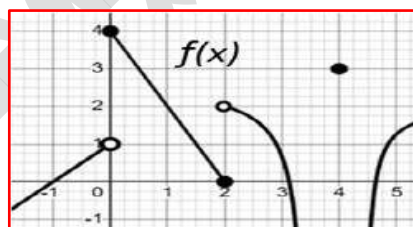
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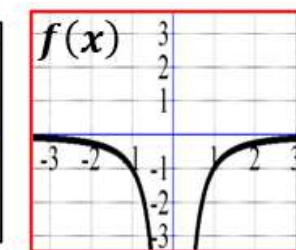
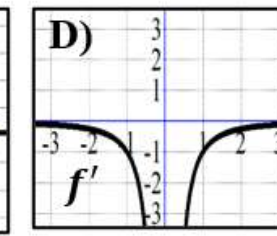
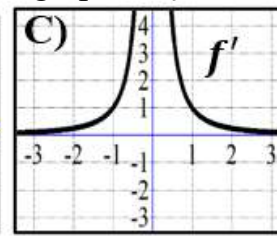
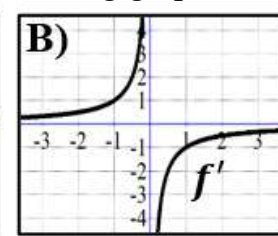
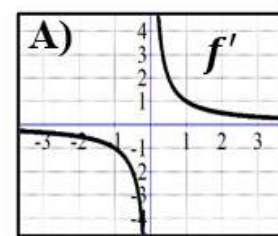
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45. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2 - 4}}$

- A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None

46. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)

- A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist

47. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?

- A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$

48. A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 . At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?

- A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s

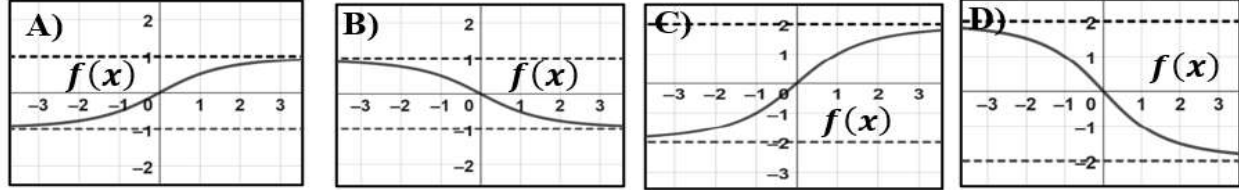
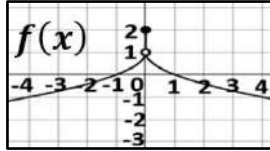
49. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$

- A) $\frac{1}{4}$ B) $\frac{-1}{4}$ C) 1 D) -1

50. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$

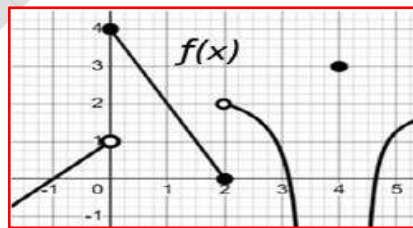
- A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$

Choose the correct option two marks for each right answer .

- Which of the following function is differentiable at $x = 0$
 A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$
- Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$

- If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
 A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$
- Use the given graph on the right, Which of the following is true ?

 A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
 C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$
- If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$
 A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$
- The result of $\int 2x \sin x dx$ is :
 A) $2 \sin x - 2x \cos x + c$ B) $2 \cos x - 2x \sin x + c$
 C) $2 \cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$
- Which of the following is true ?
 A) $\lim_{x \rightarrow -\infty} \frac{2 \sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$
- Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) $(1, 1)$ B) $(0, 0)$ C) $(2, 4)$ D) $(\frac{1}{2}, \frac{1}{4})$
- Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$
 A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$
- Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
 A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$
- Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$
 A) 1 B) -1 C) -3 D) 5

- If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?
 A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$
- Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x -axis and the two vertical lines $x = 0$ and $x = 1$
 A) 27 B) 28 C) 30 D) 31
- If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$
 A) 2 B) 1 C) 0 D) 4
- Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$
 A) $(3, 2)$ B) $(-3, 0)$ C) $(1, 2)$ D) $(0, 4)$
- The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :
 A) $]4, +\infty[$ B) $]3, +\infty[$ C) $] -\infty, 4[$ D) $] -\infty, 3[$
- Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$
 A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$
- Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2 - 3x + 2}{x^2 - 2x}$ B) $f(x) = \frac{x^2 - x - 6}{x^2 + 2x}$ C) $f(x) = \frac{x^2 - 3x + 2}{x^2 + 2x}$ D) $f(x) = \frac{x^2 - x - 6}{x^2 - 2x}$
- Find the second derivative of the function $f(x) = 2 \sin 2x \cos 2x$
 A) $2 \sin 2x$ B) $2 \cos 4x$ C) $-16 \sin 4x$ D) $8 \sin 4x$
- Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
- Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x} + 1}{\sqrt{x} + 5}$
 A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0
- Which function has exactly one local extrema ?
 A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$
- What is the domain of the function $f(x) = \frac{5}{|x+4|}$
 A) $] -\infty, +\infty[$ B) $] -4, +\infty[$ C) $] -\infty, -4[\cup] -4, +\infty[$ D) $] 0, +\infty[$
- Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $] 0, 2\pi[$
 A) $] 0, \frac{\pi}{2}[$ B) $] \frac{\pi}{2}, \frac{3\pi}{2}[$ C) $] \frac{3\pi}{2}, 2\pi[$ D) $] 0, \frac{\pi}{2}[\cup] \frac{\pi}{2}, \frac{3\pi}{2}[$
- A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?
 A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s
- Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$
 A) $\frac{2}{9}$ B) $\frac{-2}{9}$ C) $\frac{2}{3}$ D) $\frac{-2}{3}$

27. The result of $\int_{-1}^1 (1 - |x|) dx$ is :
 A) 3 B) 0 C) 1 D) 2
28. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2-4}}$
 A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None
29. Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.
 A) $(0, 1)$ B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$
30. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)
 A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist
31. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$
 A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$
32. Which of the following function the inflection point is $(0,0)$?
 A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$
33. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.
 A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$
34. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$
 A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$
35. The range of which of the following functions is $[1, +\infty[$?
 A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x-1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$
36. If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$
 Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
 A) -27 B) -18 C) -12 D) 36
37. In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?
 A) 100 m B) 150 m C) 96 m D) 125 m
38. If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$
 A) -4 B) 4 C) 2 D) -2
39. Use the given graph on the right, to find the result of
 $\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$
 A) 7 B) 3 C) 5 D) 1
40. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$
 A) $\frac{1}{4}$ B) $\frac{-1}{4}$ C) 1 D) -1

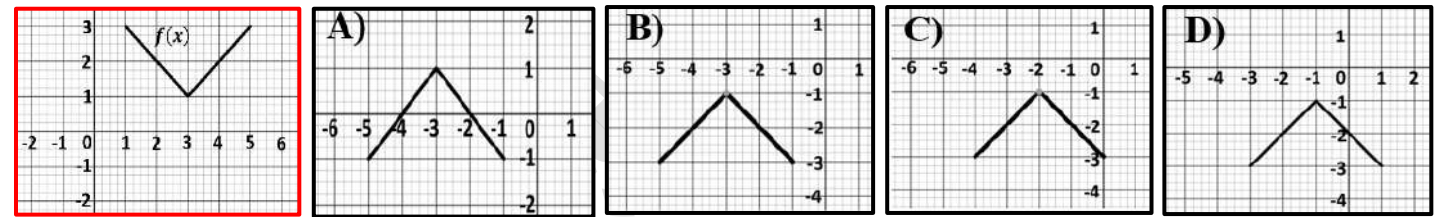


41. Determine the value of a and b such that the function is continuous everywhere.

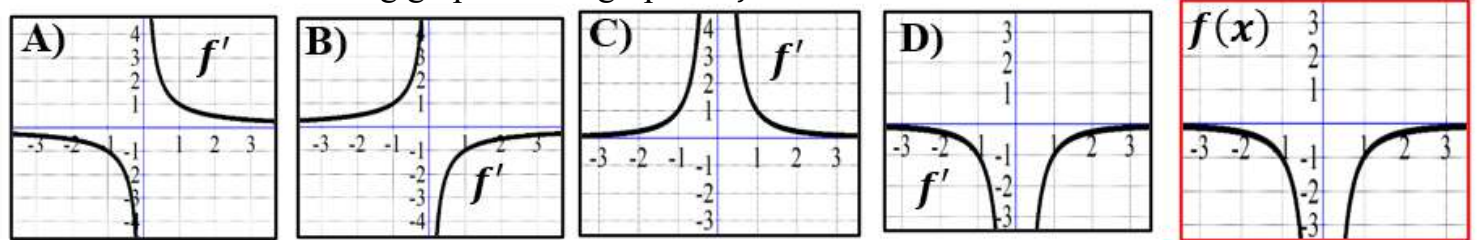
$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

- A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$

42. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x-1))$



43. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?



44. which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2 - 6x + 9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non-removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$

45. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?
 A) $-3x(x+1)$ B) $(x+1)^2$ C) $-(x+1)$ D) $3(x+1)$

46. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$
 A) 0 B) 2 C) 4 D) -1

47. Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2

48. Which the following equation is symmetric with respect to the y-axis?

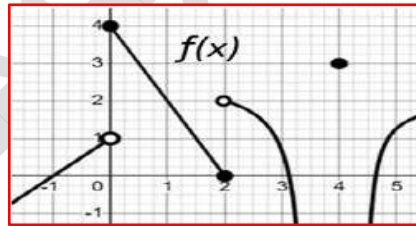
A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x+1)^2 + 6x$ D) $y = \frac{x^2-x}{\tan x}$

49. Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$

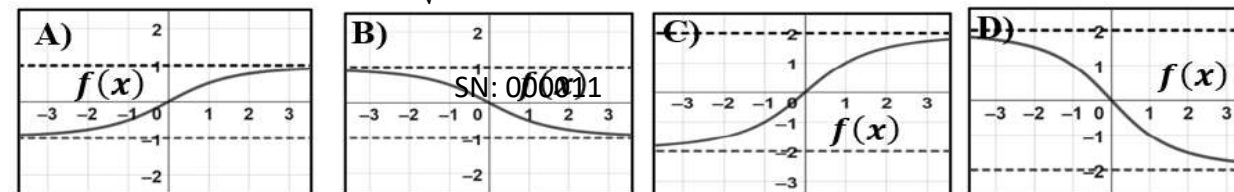
50. The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :

A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$

Choose the correct option two marks for each right answer .

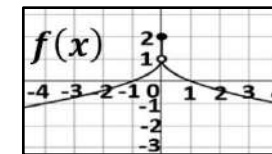
- If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?
 A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$
- Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$
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 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
- What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$
 A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1
- The result of $\int 2x \sin x dx$ is :
 A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
 C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$
- If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
 A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$
- Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2-2x^3}{x^3+x^2-1}$
 A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$
- Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2
- Use the given graph on the right, to find the result of $\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$
 A) 7 B) 3
 C) 5 D) 1
 
- The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :
 A) $]4, +\infty[$ B) $]3, +\infty[$ C) $]-\infty, 4[$ D) $]-\infty, 3[$

- Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$



- Use the given graph on the right, Which of the following is true ?

- A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
 C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$



- Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$

- A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$

- Which of the following function the inflection point is $(0, 0)$?

- A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$

- Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$

- A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$

- A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?

- A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s

- Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.

- A) $(0, 1)$ B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$

- Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2-4}}$

- A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None

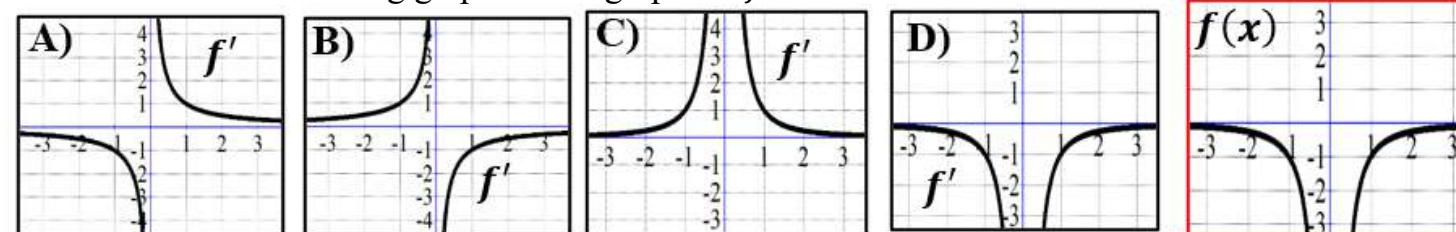
- Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$

- A) 27 B) 28 C) 30 D) 31

- What is the domain of the function $f(x) = \frac{5}{|x+4|}$

- A) $]-\infty, +\infty[$ B) $]-4, +\infty[$ C) $]-\infty, -4[\cup]-4, +\infty[$ D) $]0, +\infty[$

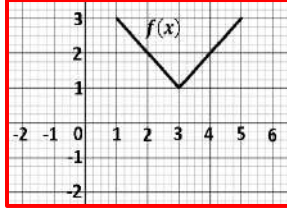
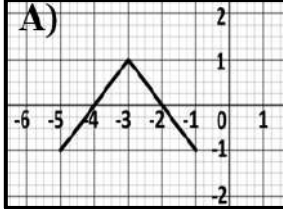
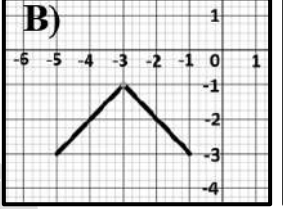
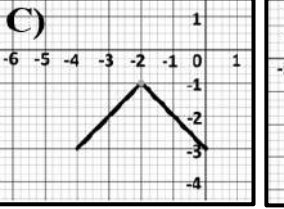
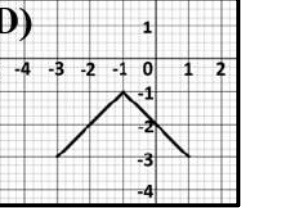
- The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?



23. If $\int_1^2 f(x)dx = 6$ and $\int_2^4 f(x)dx = -4$ then find the value of $2\int_4^1 f(x)dx$
 A) -4 B) 4 C) 2 D) -2
24. Find the result of $\lim_{x \rightarrow +\infty} \frac{x+\sqrt{x}+1}{\sqrt{x}+5}$
 A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0
25. The range of which of the following functions is $[1, +\infty[$?
 A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x-1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$
26. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$
 A) 0 B) 2 C) 4 D) -1
27. Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
28. If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$
 A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$
29. Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) (1, 1) B) (0, 0) C) (2, 4) D) $(\frac{1}{2}, \frac{1}{4})$
30. Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$
 A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$
31. Which of the following function is differentiable at $x = 0$
 A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$
32. Determine the value of a and b such that the function is continuous everywhere.

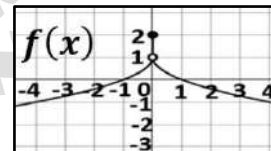
$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

 A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$
33. Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$
 A) 1 B) -1 C) -3 D) 5
34. The result of $\int_{-1}^1 (1 - |x|)dx$ is :
 A) 3 B) 0 C) 1 D) 2
35. The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
 A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$
36. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.
 A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$
37. Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2 - 3x + 2}{x^2 - 2x}$ B) $f(x) = \frac{x^2 - x - 6}{x^2 + 2x}$ C) $f(x) = \frac{x^2 - 3x + 2}{x^2 + 2x}$ D) $f(x) = \frac{x^2 - x - 6}{x^2 - 2x}$

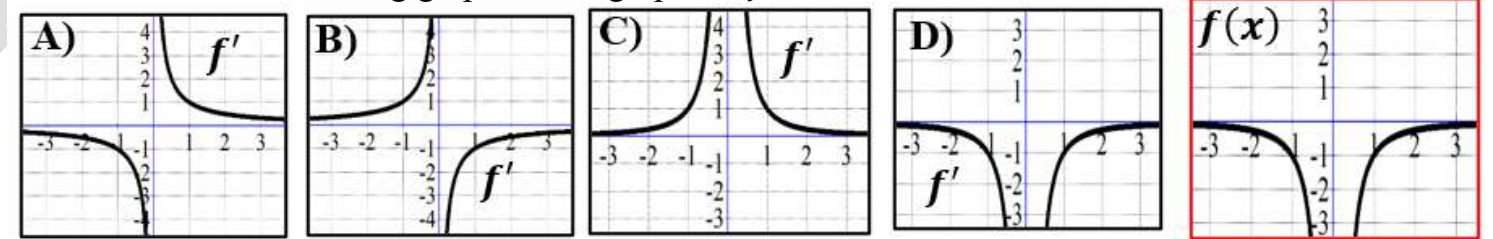
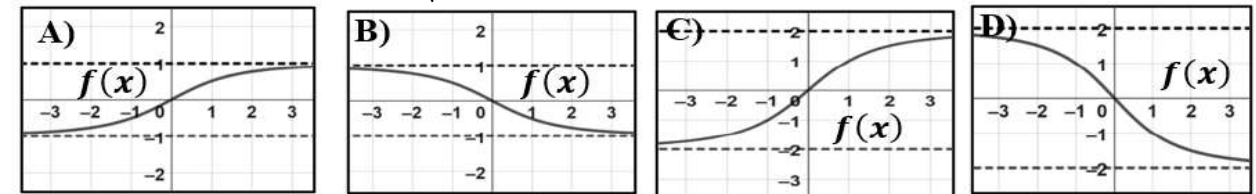
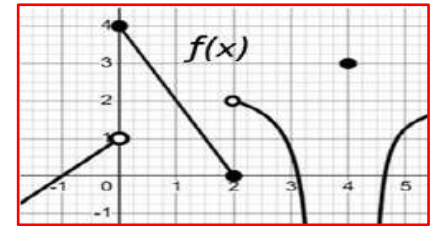
38. Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$
 A) (3, 2) B) $(-3, 0)$ C) (1, 2) D) (0, 4)
39. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x - 1))$
- 




40. Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$
 A) $]0, \frac{\pi}{2}[$ B) $[\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $[\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup [\frac{\pi}{2}, \frac{3\pi}{2}[$
41. If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$ Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
 A) -27 B) -18 C) -12 D) 36
42. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)
 A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist
43. Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$
 A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$
44. Which the following equation is symmetric with respect to the y-axis?
 A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$
45. Which of the following is true ?
 A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$
46. Which function has exactly one local extrema ?
 A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$
47. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$
 A) 2 B) 1 C) 0 D) 4
48. Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$
 A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$
49. Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
50. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x + 1)$?
 A) $-3x(x + 1)$ B) $(x + 1)^2$ C) $-(x + 1)$ D) $3(x + 1)$

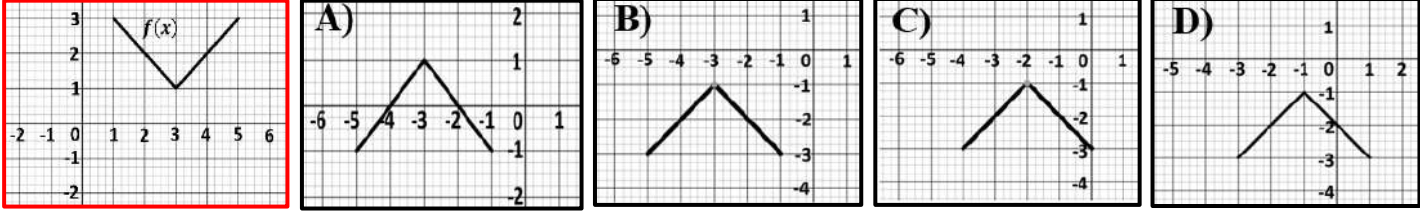
Choose the correct option two marks for each right answer .

- Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$
- Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2-2x^3}{x^3+x^2-1}$
 A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$
- The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :
 A) $]4, +\infty[$ B) $]3, +\infty[$ C) $] -\infty, 4[$ D) $] -\infty, 3[$
- Which of the following function the inflection point is (0,0) ?
 A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$
- Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$
 A) $\frac{2}{9}$ B) $\frac{-2}{9}$ C) $\frac{2}{3}$ D) $\frac{-2}{3}$
- In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?
 A) 100 m B) 150 m C) 96 m D) 125 m
- Find the result of $\lim_{x \rightarrow +\infty} \frac{x+\sqrt{x}+1}{\sqrt{x}+5}$
 A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0
- Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$
 A) $]0, \frac{\pi}{2}[$ B) $[\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $[\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup [\frac{\pi}{2}, \frac{3\pi}{2}[$
- Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2-4}}$
 A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None
- Use the given graph on the right, Which of the following is true ?
 A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
 C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$
- Which of the following function is differentiable at $x = 0$
 A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$
- Which function has exactly one local extrema ?
 A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$
- Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$
 A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$



- If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$
 A) 2 B) 1 C) 0 D) 4
- If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?
 A) $-3x(x+1)$ B) $(x+1)^2$ C) $-(x+1)$ D) $3(x+1)$
- Use the given graph on the right, to find the result of
 $\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$
 A) 7 B) 3
 C) 5 D) 1
- Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$
 A) B) C) D)
- Which the following point on the line with the slope is undefined and passes through the point (-3,4)
 A) (3,2) B) (-3,0) C) (1,2) D) (0,4)
- The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?
 A) B) C) D)
- What is the domain of the function $f(x) = \frac{5}{|x+4|}$
 A) $] -\infty, +\infty[$ B) $] -4, +\infty[$ C) $] -\infty, -4[\cup] -4, +\infty[$ D) $]0, +\infty[$
- What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point (-2,0)
 A) $\frac{1}{4}$ B) $\frac{-1}{4}$ C) 1 D) -1
- If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$
 A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$
- Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.
 A) (0, 1) B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$
- If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$
 Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
 A) -27 B) -18 C) -12 D) 36



25. The result of $\int 2x \sin x dx$ is :
 A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
 C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$
26. A car that had stopped at the traffic lights started at an acceleration of $4 m/s^2$. At the same time a truck overtook the car at a constant velocity of $16 m/s$. What will the velocity of the car be when it overtook by the truck ?
 A) $45 m/s$ B) $128 m/s$ C) $60 m/s$ D) $32 m/s$
27. Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$
 A) 27 B) 28 C) 30 D) 31
28. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.
 A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$
29. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x - 1))$
- 
30. The result of $\int_{-1}^1 (1 - |x|) dx$ is :
 A) 3 B) 0 C) 1 D) 2
31. Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
 A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$
32. Which of the following is true ?
 A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$
33. If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
 A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$
34. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)
 A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist
35. The range of which of the following functions is $[1, +\infty[$?
 A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x - 1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$
36. Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) $(1, 1)$ B) $(0, 0)$ C) $(2, 4)$ D) $(\frac{1}{2}, \frac{1}{4})$
37. If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$
 A) -4 B) 4 C) 2 D) -2

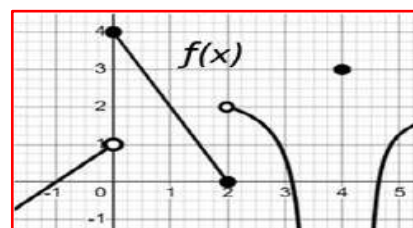
38. which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non-removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
39. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$
 A) 0 B) 2 C) 4 D) -1
40. Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
41. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?
 A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$
42. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$
 A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$
43. Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2
44. The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
 A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$
45. Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$
 A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$
46. Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

 A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$
47. Find the value of $f(0)$ If $f'(x) = 2\sin x + 3\cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$
 A) 1 B) -1 C) -3 D) 5
48. Which the following equation is symmetric with respect to the y-axis?
 A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$
49. Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
50. Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$
 A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$

Choose the correct option two marks for each right answer .

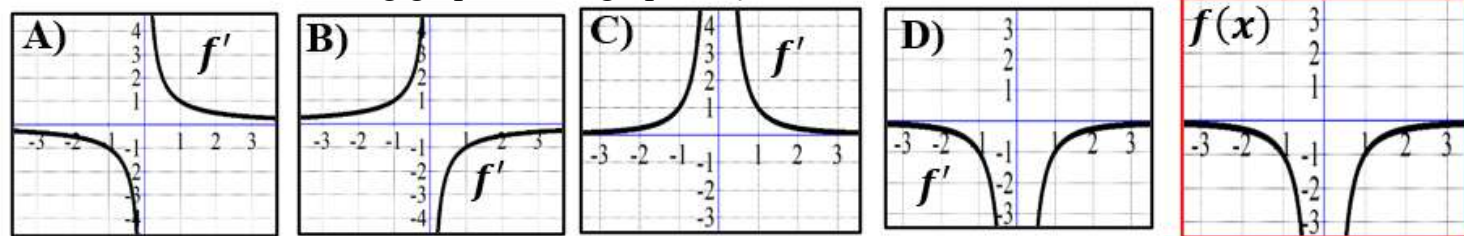
- What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2,0)$
 A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1
- The range of which of the following functions is $[1, +\infty[$?
 A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x-1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$
- The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
 A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$
- Use the given graph on the right, to find the result of
 $\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$
 A) 7 B) 3
 C) 5 D) 1



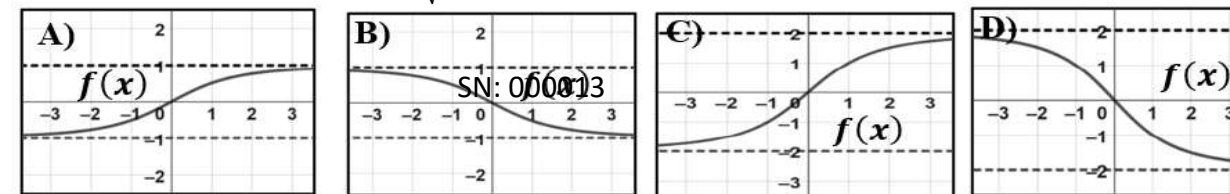
- If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$
 A) 2 B) 1 C) 0 D) 4
- Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

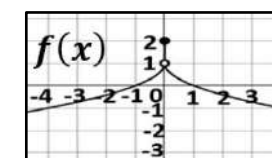
 A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$
- If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$
 A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$
- Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
 A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$
- Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$
 A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$
- The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?



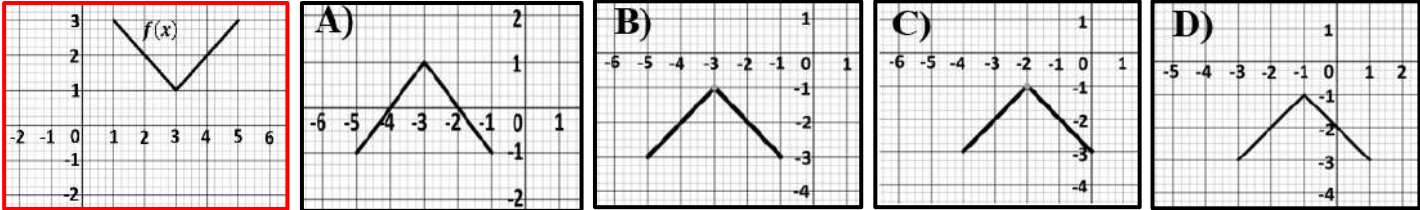
- Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$



- Find the equation of the line that passes through the point $(-1,3)$ and that is parallel to the x-axis.
 A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$
- Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$
 A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$
- Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$
 A) 27 B) 28 C) 30 D) 31
- Which the following equation is symmetric with respect to the y-axis?
 A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$
- Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$
 A) 1 B) -1 C) -3 D) 5
- A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?
 A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s
- Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
- Use the given graph on the right, Which of the following is true ?
 A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
 C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$



- Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) $(1, 1)$ B) $(0, 0)$ C) $(2, 4)$ D) $(\frac{1}{2}, \frac{1}{4})$
- In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?
 A) 100 m B) 150 m C) 96 m D) 125 m
- Which of the following function the inflection point is $(0,0)$?
 A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$
- Which the following point on the line with the slope is undefined and passes through the point $(-3,4)$
 A) $(3,2)$ B) $(-3,0)$ C) $(1,2)$ D) $(0,4)$

24. If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
 A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$
25. Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$
 A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$
26. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x - 1))$
- 
27. Which of the following is true ?
 A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$
28. which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
29. Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$
30. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)
 A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist
31. Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.
 A) $(0, 1)$ B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$
32. Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$
 A) $]0, \frac{\pi}{2}[$ B) $]\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $]\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$
33. What is the domain of the function $f(x) = \frac{5}{|x+4|}$
 A) $] -\infty, +\infty[$ B) $] -4, +\infty[$ C) $] -\infty, -4[\cup] -4, +\infty[$ D) $]0, +\infty[$
34. The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :
 A) $]4, +\infty[$ B) $]3, +\infty[$ C) $] -\infty, 4[$ D) $] -\infty, 3[$
35. The result of $\int_{-1}^1 (1 - |x|) dx$ is :
 A) 3 B) 0 C) 1 D) 2
36. Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$
 A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$
37. Which function has exactly one local extrema ?
 A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$

38. Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x} + 1}{\sqrt{x} + 5}$
 A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0
39. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$
 A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$
40. If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$ Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
 A) -27 B) -18 C) -12 D) 36
41. Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$
 A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$
42. The result of $\int 2x \sin x dx$ is :
 A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
 C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$
43. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?
 A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$
44. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2 - 4}}$
 A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None
45. Which of the following function is differentiable at $x = 0$
 A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$
46. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x + 1)$?
 A) $-3x(x + 1)$ B) $(x + 1)^2$ C) $-(x + 1)$ D) $3(x + 1)$
47. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1 + \Delta x) - f(1)}{\Delta x}$
 A) 0 B) 2 C) 4 D) -1
48. Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4} - 1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x - x^2) - 4}{x - 2}$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2
49. Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
50. If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$
 A) -4 B) 4 C) 2 D) -2

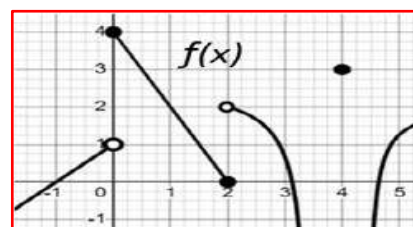
Choose the correct option two marks for each right answer .

- What is the domain of the function $f(x) = \frac{5}{|x+4|}$
 A) $]-\infty, +\infty[$ B) $]-4, +\infty[$ C) $]-\infty, -4[\cup]-4, +\infty[$ D) $]0, +\infty[$
- Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$
 A) $]0, \frac{\pi}{2}[$ B) $]\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $]\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$
- Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$
 A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$
- The result of $\int_{-1}^1 (1 - |x|) dx$ is :
 A) 3 B) 0 C) 1 D) 2
- The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :
 A) $]4, +\infty[$ B) $]3, +\infty[$ C) $]-\infty, 4[$ D) $]-\infty, 3[$
- Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) (1, 1) B) (0, 0) C) (2, 4) D) $(\frac{1}{2}, \frac{1}{4})$

7. Use the given graph on the right, to find the result of

$$\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$$

A) 7 B) 3
C) 5 D) 1



- Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2-4}}$
 A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None
- Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$

- Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$
 A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$
- A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 . At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?
 A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s

- If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?
 A) $-3x(x+1)$ B) $(x+1)^2$ C) $-(x+1)$ D) $3(x+1)$

- Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2

- If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
 A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$

- Which of the following is true ?
 A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$

- Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.
 A) (0, 1) B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$

- Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$
 A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$

- The result of $\int 2x \sin x dx$ is :
 A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
 C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

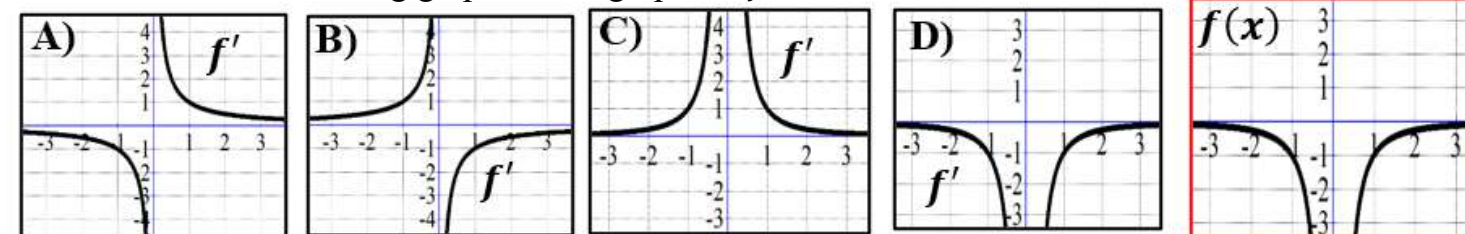
- What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$
 A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1

- Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$

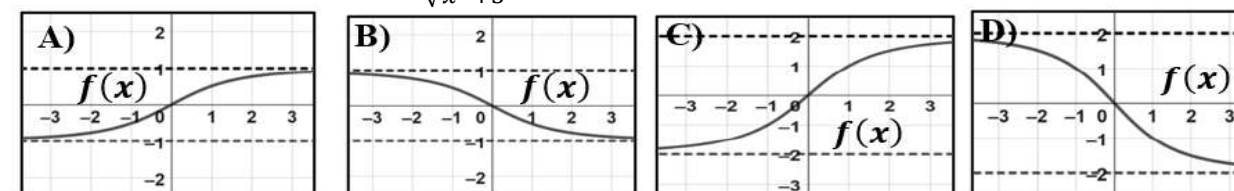
- If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$
 A) -4 B) 4 C) 2 D) -2

- If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$
 Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
 A) -27 B) -18 C) -12 D) 36

- The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?



- Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$



- The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
 A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$

26. Which of the following function the inflection point is (0,0) ?

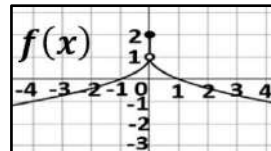
- A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$

27. Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$

- A) 27 B) 28 C) 30 D) 31

28. Use the given graph on the right, Which of the following is true ?

- A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$



29. Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$

- A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$

30. Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x} + 1}{\sqrt{x} + 5}$

- A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0

31. If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$

- A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$

32. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$

- A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$

33. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$

- A) 0 B) 2 C) 4 D) -1

34. Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$

- A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$

35. Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

- A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$

36. Which of the following function is differentiable at $x = 0$

- A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$

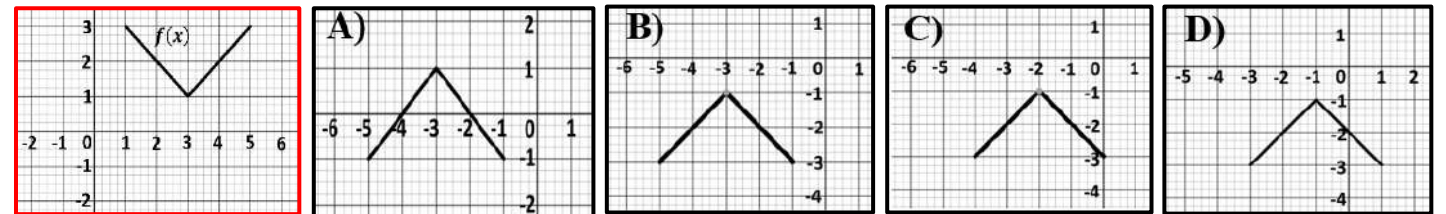
37. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?

- A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$

38. Which function has exactly one local extrema ?

- A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$

39. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x - 1))$



40. Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$

- A) 1 B) -1 C) -3 D) 5

41. Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$

- A) (3, 2) B) (-3, 0) C) (1, 2) D) (0, 4)

42. In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?

- A) 100 m B) 150 m C) 96 m D) 125 m

43. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.

- A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$

44. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)

- A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist

45. The range of which of the following functions is $[1, +\infty[$?

- A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x - 1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$

46. Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$

where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$

- A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$

47. Which the following equation is symmetric with respect to the y-axis?

- A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$

48. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$

- A) 2 B) 1 C) 0 D) 4

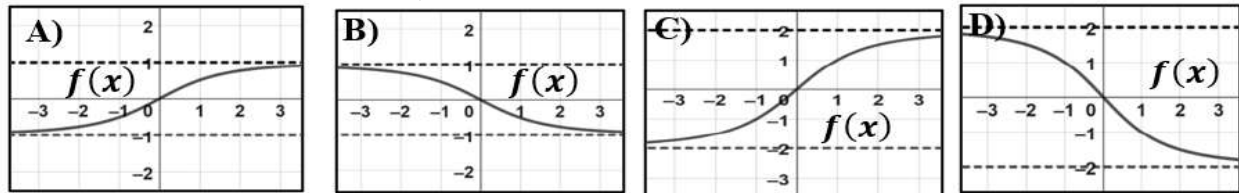
49. which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$

- A) The function $f(x)$ is discontinuous at $x = 3$ and non-removable B) $f'(2) = 1$
C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$

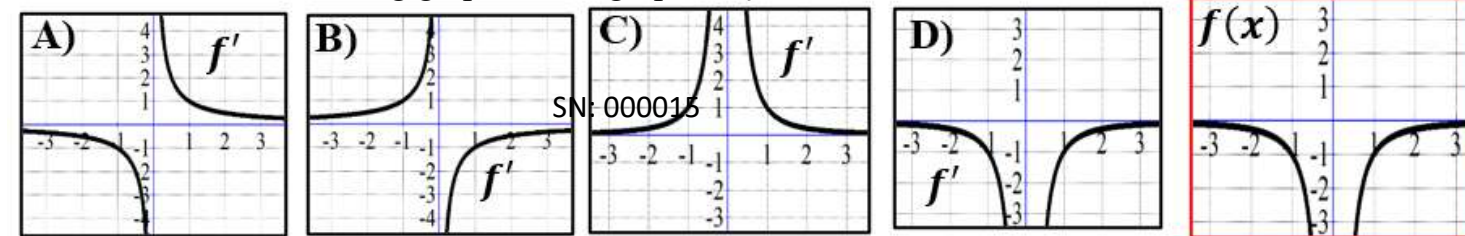
50. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$

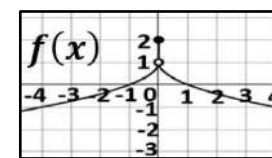
- A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$

Choose the correct option two marks for each right answer .

- Find the result of $\lim_{x \rightarrow +\infty} \frac{x+\sqrt{x}+1}{\sqrt{x}+5}$
 A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0
- Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$
 A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$
- which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
- Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$

- Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$
 A) 1 B) -1 C) -3 D) 5
- Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)
 A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist
- Which of the following function is differentiable at $x = 0$
 A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$
- Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$
 A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$
- Which of the following function the inflection point is $(0,0)$?
 A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$
- Find the equation of the line that passes through the point $(-1,3)$ and that is parallel to the x-axis.
 A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$

11. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?

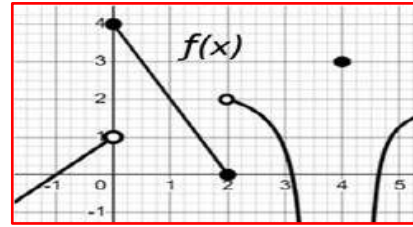


12. A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 . At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?
 A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s
13. If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$ Knowing that $\lim_{x \rightarrow -2} \frac{g(x)-g(-2)}{x+2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
 A) -27 B) -18 C) -12 D) 36
14. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2-4}}$
 A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None
15. Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$
16. Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) $(1, 1)$ B) $(0, 0)$ C) $(2, 4)$ D) $(\frac{1}{2}, \frac{1}{4})$
17. Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
 A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$
18. Use the given graph on the right, Which of the following is true ?
 A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
 C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$
- 
19. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?
 A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$
20. If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$
 A) -4 B) 4 C) 2 D) -2
21. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2-2x^3}{x^3+x^2-1}$
 A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$

22. Use the given graph on the right, to find the result of

$$\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$$

A) 7 B) 3
C) 5 D) 1



23. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$

A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1

24. If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :

A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$

25. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x + 1)$?

A) $-3x(x + 1)$ B) $(x + 1)^2$ C) $-(x + 1)$ D) $3(x + 1)$

26. Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$

27. In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?

A) 100 m B) 150 m C) 96 m D) 125 m

28. Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$

A) $]0, \frac{\pi}{2}[$ B) $[\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $[\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup [\frac{\pi}{2}, \frac{3\pi}{2}[$

29. The range of which of the following functions is $[1, +\infty[$?

A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x - 1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$

30. Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$

A) (3, 2) B) (-3, 0) C) (1, 2) D) (0, 4)

31. Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$

A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$

32. The result of $\int_{-1}^1 (1 - |x|) dx$ is :

A) 3 B) 0 C) 1 D) 2

33. If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$

A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$

34. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$

A) 2 B) 1 C) 0 D) 4

35. Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$

A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$

36. Which of the following is true ?

A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$

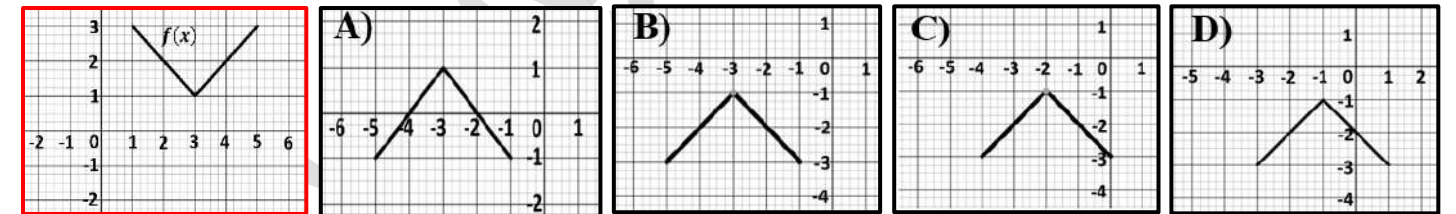
37. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$

A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$

38. Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$

A) 27 B) 28 C) 30 D) 31

39. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x - 1))$



40. Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.

A) (0, 1) B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$

41. Which function has exactly one local extrema ?

A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$

42. The result of $\int 2x \sin x dx$ is :

A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

43. Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$

A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$

44. The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :

A) $]4, +\infty[$ B) $]3, +\infty[$ C) $] -\infty, 4[$ D) $] -\infty, 3[$

45. The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :

A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$

46. Which the following equation is symmetric with respect to the y-axis?

A) $x^2 y + x = x^3 y$ B) $x^2 + y = x^4 y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$

47. Find the critical value of the function $f(x) = xe^{-x}$

A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$

48. Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$

A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2

49. What is the domain of the function $f(x) = \frac{5}{|x+4|}$

A) $] -\infty, +\infty[$ B) $] -4, +\infty[$ C) $] -\infty, -4[\cup] -4, +\infty[$ D) $] 0, +\infty[$

50. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$

A) 0 B) 2 C) 4 D) -1

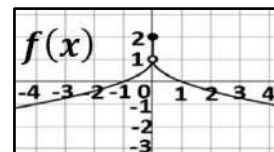
Choose the correct option two marks for each right answer .

1. Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$

A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2

2. Use the given graph on the right, Which of the following is true ?

A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
 C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$

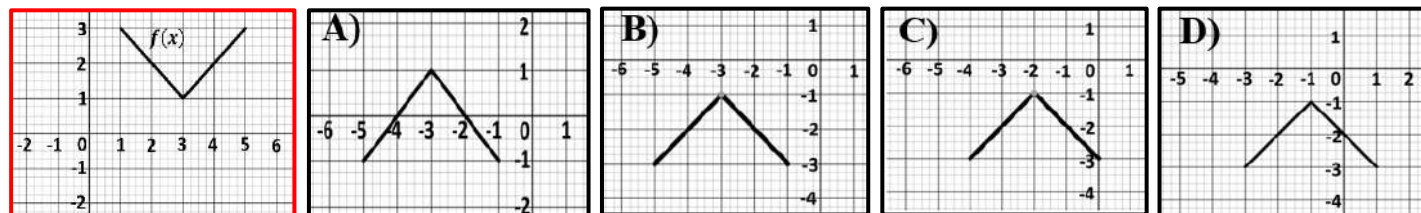


3. Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$

4. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x-1))$



5. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.

A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$

6. The result of $\int_{-1}^1 (1 - |x|) dx$ is :

A) 3 B) 0 C) 1 D) 2

7. Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x} + 1}{\sqrt{x} + 5}$

A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0

8. In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?

A) 100 m B) 150 m C) 96 m D) 125 m

9. The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :

A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$

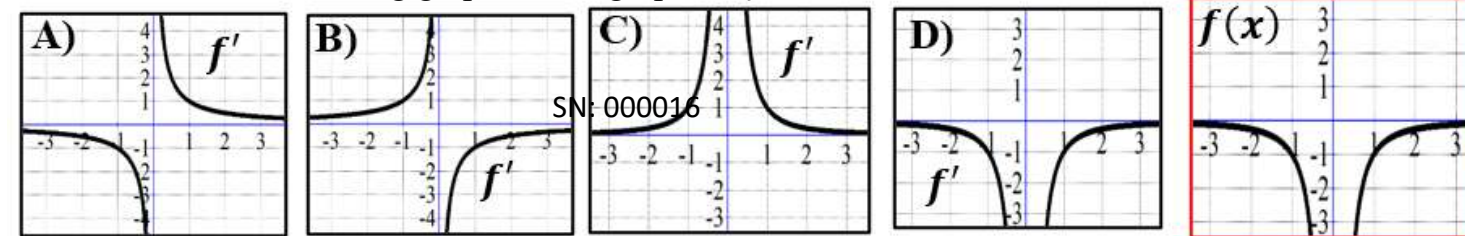
10. Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$

A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$

11. Which the following equation is symmetric with respect to the y-axis?

A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$

12. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?



13. What is the domain of the function $f(x) = \frac{5}{|x+4|}$

A) $]-\infty, +\infty[$ B) $]-4, +\infty[$ C) $]-\infty, -4[\cup]-4, +\infty[$ D) $]0, +\infty[$

14. Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$

A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$

15. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$

A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = -\frac{2}{3}$

16. Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$

A) (1, 1) B) (0, 0) C) (2, 4) D) $(\frac{1}{2}, \frac{1}{4})$

17. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$

A) 2 B) 1 C) 0 D) 4

18. The result of $\int 2x \sin x dx$ is :

A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
 C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

19. Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$

A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$

20. Which of the following function the inflection point is (0,0) ?

A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$

21. A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 . At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?

A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s

22. Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$

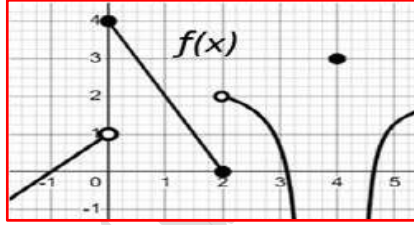
A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$

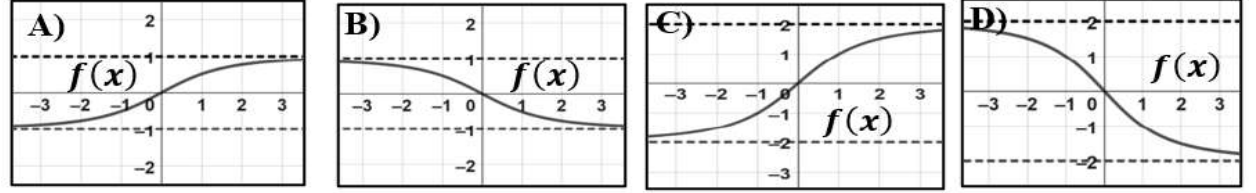
23. Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.

A) (0, 1) B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$

24. If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$

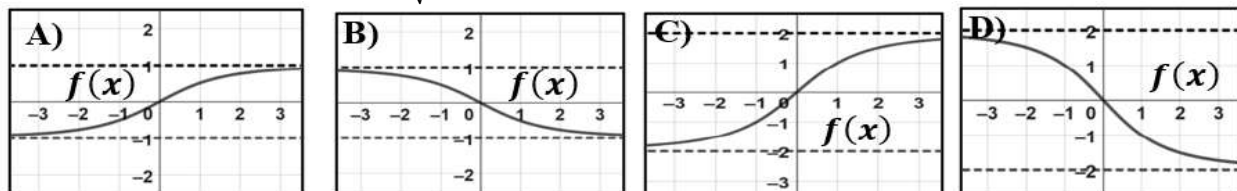
A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$

25. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?
 A) $-3x(x+1)$ B) $(x+1)^2$ C) $-(x+1)$ D) $3(x+1)$
26. The range of which of the following functions is $[1, +\infty[$?
 A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x-1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$
27. Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
 A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$
28. If $\int_1^2 f(x)dx = 6$ and $\int_2^4 f(x)dx = -4$ then find the value of $2\int_4^1 f(x)dx$
 A) -4 B) 4 C) 2 D) -2
29. which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
30. Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
31. Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$
 A) $(3, 2)$ B) $(-3, 0)$ C) $(1, 2)$ D) $(0, 4)$
32. Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$
 A) $]0, \frac{\pi}{2}[$ B) $]\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $]\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$
33. The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :
 A) $]4, +\infty[$ B) $]3, +\infty[$ C) $] -\infty, 4[$ D) $] -\infty, 3[$
34. Use the given graph on the right, to find the result of
 $\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$
 A) 7 B) 3
 C) 5 D) 1
- 
35. Which of the following function is differentiable at $x = 0$
 A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$
36. Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$
 A) 27 B) 28 C) 30 D) 31
37. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2-4}}$
 A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None
38. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$
 A) 0 B) 2 C) 4 D) -1

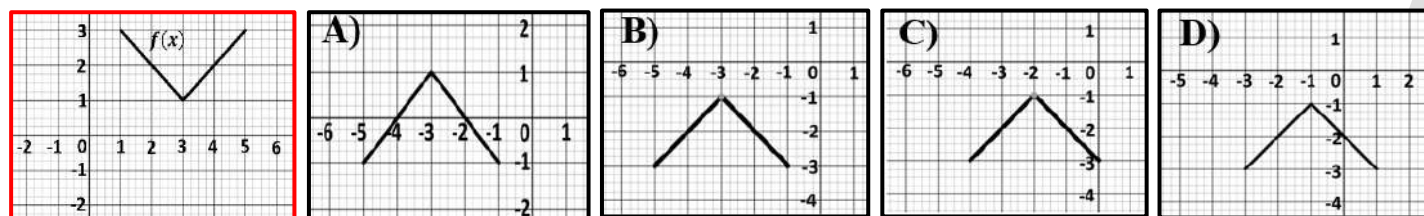
39. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$
 A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1
40. If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$ Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
 A) -27 B) -18 C) -12 D) 36
41. Which of the following is true ?
 A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$
42. Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$
 A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$
43. Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$
44. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$
 A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$
45. Which function has exactly one local extrema ?
 A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$
46. If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
 A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$
47. Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$
 A) 1 B) -1 C) -3 D) 5
48. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?
 A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$
49. Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$
- 
50. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)
 A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist

Choose the correct option two marks for each right answer .

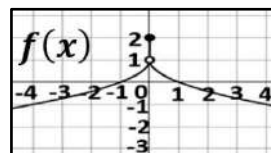
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2. Find the result of $\lim_{x \rightarrow +\infty} \frac{x+\sqrt{x}+1}{\sqrt{x}+5}$
 A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0
3. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x+\sin 5x}{-3x}$ then find the value of c ?
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 A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None
5. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x-1))$



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 A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
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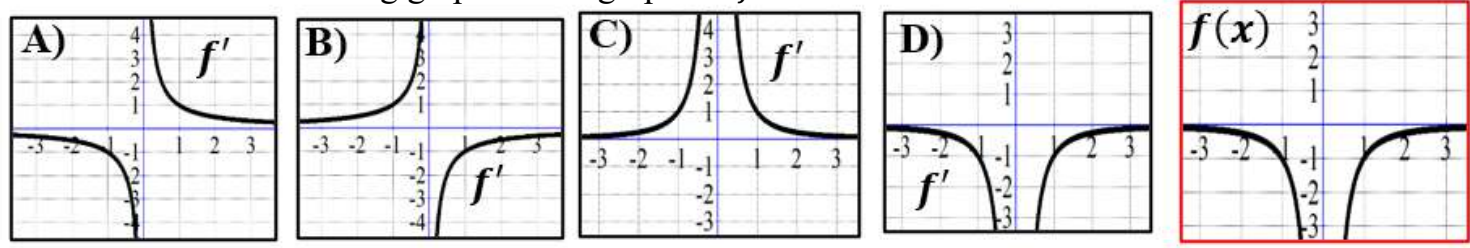
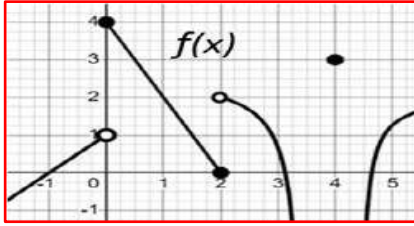
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 A) (1, 1) B) (0, 0) C) (2, 4) D) $(\frac{1}{2}, \frac{1}{4})$

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 A) 0 B) 2 C) 4 D) -1
19. Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2
20. Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.
 A) (0, 1) B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$
21. Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
22. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2-2x^3}{x^3+x^2-1}$
 A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$
23. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$
 A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$
24. Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

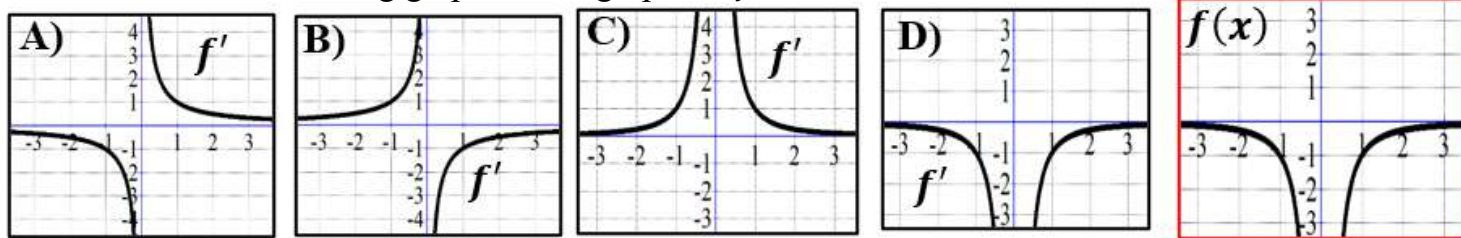
 A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$

25. The result of $\int 2x \sin x dx$ is :
 A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
 C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$
26. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?
 A) $-3x(x+1)$ B) $(x+1)^2$ C) $-(x+1)$ D) $3(x+1)$
27. The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
 A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$
28. The range of which of the following functions is $[1, +\infty[$?
 A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x-1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$
29. If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
 A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$
30. Which the following equation is symmetric with respect to the y-axis?
 A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x+1)^2 + 6x$ D) $y = \frac{x^2-x}{\tan x}$
31. A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?
 A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s
32. Which of the following function is differentiable at $x = 0$
 A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$
33. Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$
 A) $(3, 2)$ B) $(-3, 0)$ C) $(1, 2)$ D) $(0, 4)$
34. Which of the following is true ?
 A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$
35. Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$
36. Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$
 A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$
37. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$
 A) 2 B) 1 C) 0 D) 4
38. Find the value of $f(0)$ If $f'(x) = 2\sin x + 3\cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$
 A) 1 B) -1 C) -3 D) 5
39. Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$
 A) 27 B) 28 C) 30 D) 31

40. The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :
 A) $] 4, +\infty [$ B) $] 3, +\infty [$ C) $] -\infty, 4 [$ D) $] -\infty, 3 [$
41. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?

42. which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non-removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
43. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)
 A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist
44. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.
 A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$
45. Use the given graph on the right, to find the result of
 $\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$

 A) 7 B) 3
 C) 5 D) 1
46. In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?
 A) 100 m B) 150 m C) 96 m D) 125 m
47. Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
48. Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$
 A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$
49. Which of the following function the inflection point is $(0, 0)$?
 A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$
50. Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
 A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$

Choose the correct option two marks for each right answer .

1. The graph on the right shows the curve of the function f ,
 which of the following graphs is the graph of f' ?



2. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?
 A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$
3. Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2 - 3x + 2}{x^2 - 2x}$ B) $f(x) = \frac{x^2 - x - 6}{x^2 + 2x}$ C) $f(x) = \frac{x^2 - 3x + 2}{x^2 + 2x}$ D) $f(x) = \frac{x^2 - x - 6}{x^2 - 2x}$
4. Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
5. The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
 A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$
6. Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$
 A) $]0, \frac{\pi}{2}[$ B) $]\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $]\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$
7. Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$
 where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
 A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$
8. Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$
 A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$
9. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)
 A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist
10. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$
 A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1
11. Which of the following is true ?
 A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$
12. If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$
 A) -4 B) 4 C) 2 D) -2

13. Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$
 A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$
14. If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$
 A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$
15. The result of $\int_{-1}^1 (1 - |x|) dx$ is :
 A) 3 B) 0 C) 1 D) 2
16. If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$
 Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
 A) -27 B) -18 C) -12 D) 36
17. Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x} + 1}{\sqrt{x} + 5}$
 A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0
18. Which function has exactly one local extrema ?
 A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$
19. Which of the following function the inflection point is $(0, 0)$?
 A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$
20. The result of $\int 2x \sin x dx$ is :
 A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
 C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$
21. Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2 + 3}}$
22. Use the given graph on the right, to find the result of
 $\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$

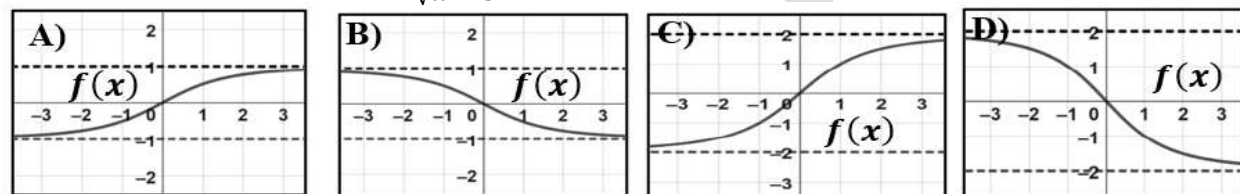
 A) 7 B) 3
 C) 5 D) 1
23. What is the domain of the function $f(x) = \frac{5}{|x+4|}$
 A) $] -\infty, +\infty[$ B) $] -4, +\infty[$ C) $] -\infty, -4[\cup] -4, +\infty[$ D) $] 0, +\infty[$
24. Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$
 where the tangent line to the graph of the function f is horizontal.
 A) $(0, 1)$ B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$
25. Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis
 and the two vertical lines $x = 0$, $x = 3$
 A) 27 B) 28 C) 30 D) 31

26. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2-4}}$
- A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None
27. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x-1))$
-
28. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?
- A) $-3x(x+1)$ B) $(x+1)^2$ C) $-(x+1)$ D) $3(x+1)$
29. Determine the value of a and b such that the function is continuous everywhere.
- $$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$
- A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$
30. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$
- A) 2 B) 1 C) 0 D) 4
31. Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
- A) (1, 1) B) (0, 0) C) (2, 4) D) $(\frac{1}{2}, \frac{1}{4})$
32. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$
- A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$
33. Use the given graph on the right, Which of the following is true?
- A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$ C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$
-
34. Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$
- A) (3, 2) B) (-3, 0) C) (1, 2) D) (0, 4)
35. Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$
- A) 1 B) -1 C) -3 D) 5
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- A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$
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39. Which of the following function is differentiable at $x = 0$
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40. which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$
- A) The function $f(x)$ is discontinuous at $x = 3$ and non-removable B) $f'(2) = 1$
C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
41. Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
- A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2
42. Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$
- A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$
43. The decreasing interval of the function $f(x) = 4 - |x - 3|$ is:
- A) $] 4, +\infty [$ B) $] 3, +\infty [$ C) $] -\infty, 4 [$ D) $] -\infty, 3 [$
44. Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$
- A) $\frac{2}{9}$ B) $\frac{-2}{9}$ C) $\frac{2}{3}$ D) $\frac{-2}{3}$
45. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.
- A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$
46. Find the critical value of the function $f(x) = xe^{-x}$
- A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
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- A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x-1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$
48. Which the following equation is symmetric with respect to the y-axis?
- A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x+1)^2 + 6x$ D) $y = \frac{x^2-x}{\tan x}$
49. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$
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50. If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is:
- A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$

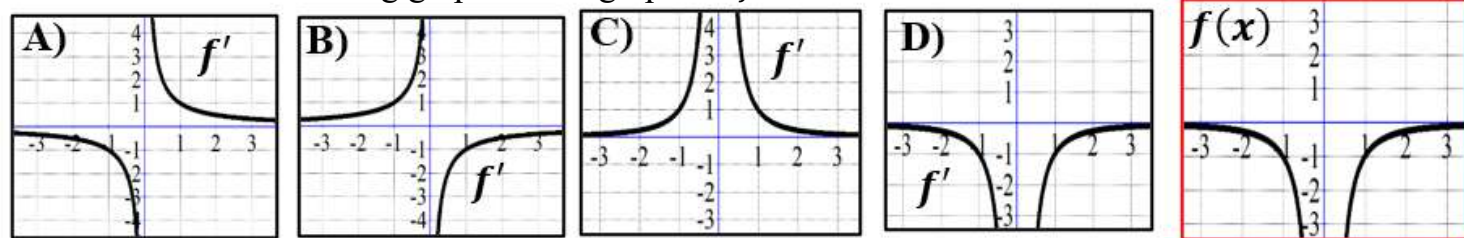
Choose the correct option two marks for each right answer .

- If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)_{\left(\frac{\pi}{2}\right)}$
 A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$
- Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$
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- If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?
 A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$
- Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
 A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$
- Which the following equation is symmetric with respect to the y-axis?
 A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$
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 A) $] 4, +\infty [$ B) $] 3, +\infty [$ C) $] -\infty, 4 [$ D) $] -\infty, 3 [$
- Which of the following is true ?
 A) $\lim_{x \rightarrow -\infty} \frac{2 \sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$
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 A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$
- which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
- Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$
- Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$



- Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$
 A) 1 B) -1 C) -3 D) 5
 - Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
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 A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s
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-
- The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
 A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$
 - Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
 - If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$
 A) -4 B) 4 C) 2 D) -2
 - Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x} + 1}{\sqrt{x} + 5}$
 A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0
 - The range of which of the following functions is $[1, +\infty[$?
 A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x - 1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$
 - If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$ Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
 A) -27 B) -18 C) -12 D) 36
 - Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) $(1, 1)$ B) $(0, 0)$ C) $(2, 4)$ D) $(\frac{1}{2}, \frac{1}{4})$
 - Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.
 A) $(0, 1)$ B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$
 - Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2

25. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?



26. Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

- A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$

27. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$

- A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$

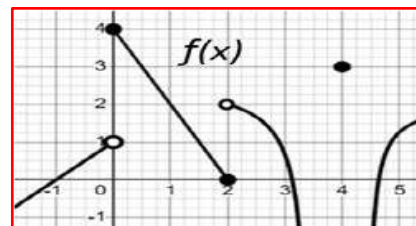
28. Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$

- A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$

29. Use the given graph on the right, to find the result of

$$\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$$

- A) 7 B) 3
C) 5 D) 1



30. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$

- A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1

31. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.

- A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$

32. In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?

- A) 100 m B) 150 m C) 96 m D) 125 m

33. Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$

- A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$

34. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$

- A) 2 B) 1 C) 0 D) 4

35. Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$

- A) $]0, \frac{\pi}{2}[$ B) $[\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $[\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$

36. Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$

- A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$

37. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?

- A) $-3x(x+1)$ B) $(x+1)^2$ C) $-(x+1)$ D) $3(x+1)$

38. Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$

- A) $(3, 2)$ B) $(-3, 0)$ C) $(1, 2)$ D) $(0, 4)$

39. What is the domain of the function $f(x) = \frac{5}{|x+4|}$

- A) $] -\infty, +\infty[$ B) $] -4, +\infty[$ C) $] -\infty, -4[\cup] -4, +\infty[$ D) $] 0, +\infty[$

40. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)

- A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist

41. Which of the following function the inflection point is $(0, 0)$?

- A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$

42. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$

- A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$

43. The result of $\int_{-1}^1 (1 - |x|) dx$ is :

- A) 3 B) 0 C) 1 D) 2

44. Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$

- A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$

45. The result of $\int 2x \sin x dx$ is :

- A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

46. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$

- A) 0 B) 2 C) 4 D) -1

47. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2 - 4}}$

- A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None

48. Which of the following function is differentiable at $x = 0$

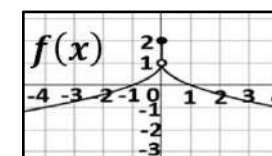
- A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$

49. If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :

- A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$

50. Use the given graph on the right, Which of the following is true?

- A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$



Choose the correct option two marks for each right answer .

- The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :
 A) $] 4 , +\infty [$ B) $] 3 , +\infty [$ C) $] -\infty , 4 [$ D) $] -\infty , 3 [$
- If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
 A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$
- Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$
 A) $(3, 2)$ B) $(-3, 0)$ C) $(1, 2)$ D) $(0, 4)$
- Which of the following is true ?
 A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$
- Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$
 A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$
- The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
 A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$
- Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$
- If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$
 A) 0 B) 2 C) 4 D) -1
- Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x-1))$

 A)
 B)
 C)
 D)
- Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$
 A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$
- Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{x}}{x}$
 A) $\frac{2}{9}$ B) $\frac{-2}{9}$ C) $\frac{2}{3}$ D) $\frac{-2}{3}$
- Which of the following function the inflection point is $(0, 0)$?
 A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$

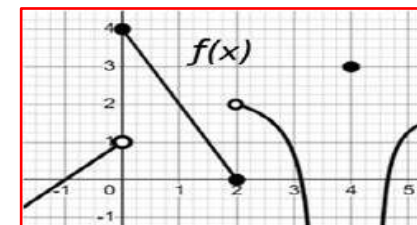
- Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) $(1, 1)$ B) $(0, 0)$ C) $(2, 4)$ D) $(\frac{1}{2}, \frac{1}{4})$
- If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?
 A) $-3x(x+1)$ B) $(x+1)^{SN: 000020}$ C) $-(x+1)$ D) $3(x+1)$
- Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2
- Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$
 A) $]0, \frac{\pi}{2}[$ B) $[\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $[\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$
- which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
- Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$
 A) 27 B) 28 C) 30 D) 31
- The range of which of the following functions is $[1, +\infty[$?
 A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x-1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$
- Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
- Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$
 A)
 B)
 C)
 D)

- If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?
 A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$

- Use the given graph on the right, to find the result of

$$\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$$

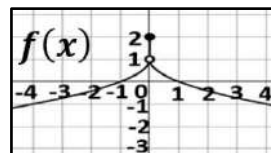
- A) 7 B) 3
 C) 5 D) 1



- Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)
 A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist
- Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.
 A) $(0, 1)$ B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$

26. Use the given graph on the right, Which of the following is true ?

- A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$



27. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$

A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$

28. In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?

- A) 100 m B) 150 m C) 96 m D) 125 m

29. The result of $\int 2x \sin x dx$ is :

- A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

30. Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$

where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$

- A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$

31. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.

- A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$

32. Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$

- A) 1 B) -1 C) -3 D) 5

33. Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$

- A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$

34. What is the domain of the function $f(x) = \frac{5}{|x+4|}$

- A) $]-\infty, +\infty[$ B) $]-4, +\infty[$ C) $]-\infty, -4[\cup]-4, +\infty[$ D) $]0, +\infty[$

35. Which function has exactly one local extrema ?

- A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$

36. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2 - 4}}$

- A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None

37. Find the critical value of the function $f(x) = xe^{-x}$

- A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$

38. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$

- A) 2 B) 1 C) 0 D) 4

39. Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x} + 1}{\sqrt{x} + 5}$

- A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0

40. If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$

Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$

- A) -27 B) -18 C) -12 D) 36

41. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$

- A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$

42. The result of $\int_{-1}^1 (1 - |x|) dx$ is :

- A) 3 B) 0 C) 1 D) 2

43. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$

- A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1

44. A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?

- A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s

45. If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$

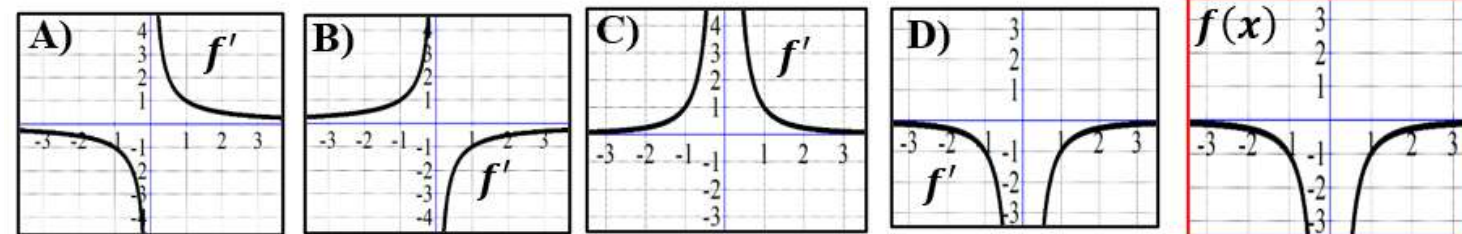
- A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$

46. Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

- A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$

47. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?



48. Which of the following function is differentiable at $x = 0$

- A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$

49. If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$

- A) -4 B) 4 C) 2 D) -2

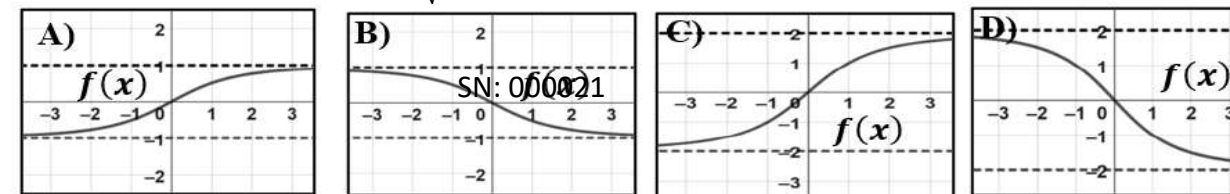
50. Which the following equation is symmetric with respect to the y-axis?

- A) $x^2 y + x = x^3 y$ B) $x^2 + y = x^4 y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$

Choose the correct option two marks for each right answer .

- Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$
 A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$
- Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
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- Which of the following function the inflection point is (0,0) ?
 A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$
- Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x} + 1}{\sqrt{x} + 5}$
 A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0
- Which the following equation is symmetric with respect to the y-axis?
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 A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$
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 A) 27 B) 28 C) 30 D) 31
- Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$
 A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$
- Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2 - 4}}$
 A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None
- Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) (1, 1) B) (0, 0) C) (2, 4) D) $(\frac{1}{2}, \frac{1}{4})$
- If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$
 Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
 A) -27 B) -18 C) -12 D) 36

13. Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2 + 3}}$



14. In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?
 A) 100 m B) 150 m C) 96 m D) 125 m

15. The result of $\int_{-1}^1 (1 - |x|) dx$ is :

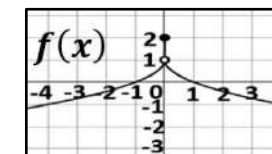
A) 3 B) 0 C) 1 D) 2

16. Which function has exactly one local extrema ?

A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$

17. Use the given graph on the right, Which of the following is true ?

A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
 C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$



18. Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$

A) $]0, \frac{\pi}{2}[$ B) $[\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $[\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$

19. If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :

A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$

20. A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 . At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?

A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s

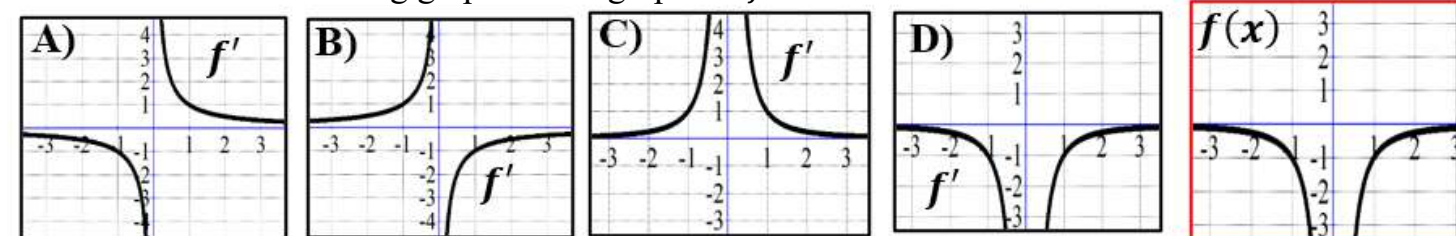
21. Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$

A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$

22. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$

A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$

23. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?



24. Find the equation of the line that passes through the point $(-1,3)$ and that is parallel to the x-axis.

- A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$

25. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$

- A) 2 B) 1 C) 0 D) 4

26. Which the following point on the line with the slope is undefined and passes through the point $(-3,4)$

- A) (3,2) B) (-3,0) C) (1,2) D) (0,4)

27. The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :

- A) $]4, +\infty[$ B) $]3, +\infty[$ C) $] -\infty, 4[$ D) $] -\infty, 3[$

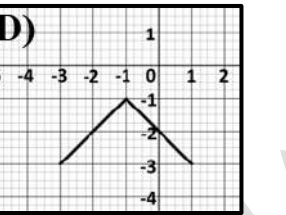
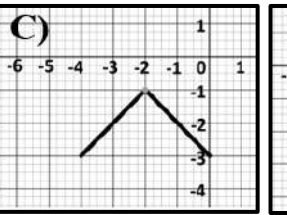
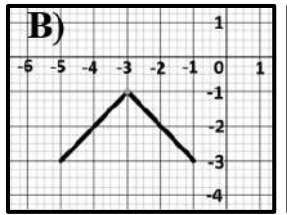
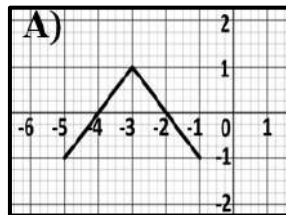
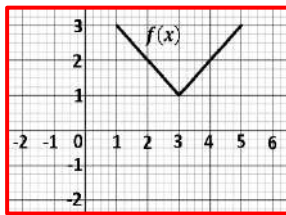
28. Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$

- A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2

29. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?

- A) $-3x(x+1)$ B) $(x+1)^2$ C) $-(x+1)$ D) $3(x+1)$

30. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x-1))$



31. Which of the following function is differentiable at $x = 0$

- A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$

32. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)

- A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist

33. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?

- A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$

34. Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.

- A) (0, 1) B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$

35. Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$

- A) $\frac{2}{9}$ B) $\frac{-2}{9}$ C) $\frac{2}{3}$ D) $\frac{-2}{3}$

36. Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$

- A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$

37. Find the critical value of the function $f(x) = xe^{-x}$

- A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$

38. Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

- A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$

39. Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$

- A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$

40. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$

- A) 0 B) 2 C) 4 D) -1

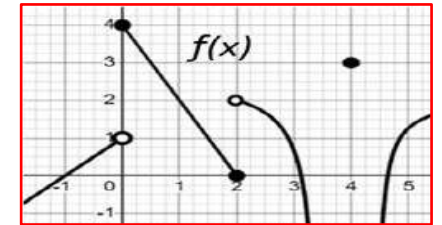
41. The result of $\int 2x \sin x dx$ is :

- A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

42. Use the given graph on the right, to find the result of

$$\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$$

- A) 7 B) 3
C) 5 D) 1



43. Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$

- A) 1 B) -1 C) -3 D) 5

44. If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$

- A) -4 B) 4 C) 2 D) -2

45. If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$

- A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$

46. The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :

- A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$

47. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$

- A) $\frac{1}{4}$ B) $\frac{-1}{4}$ C) 1 D) -1

48. What is the domain of the function $f(x) = \frac{5}{|x+4|}$

- A) $] -\infty, +\infty[$ B) $] -4, +\infty[$ C) $] -\infty, -4[\cup] -4, +\infty[$ D) $] 0, +\infty[$

49. which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$

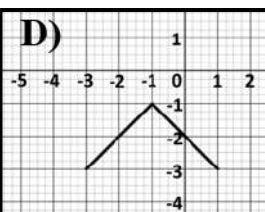
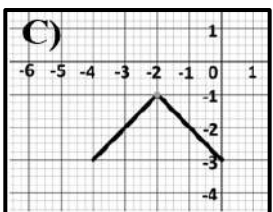
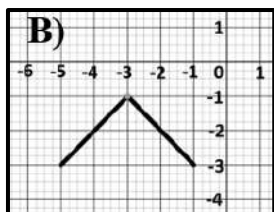
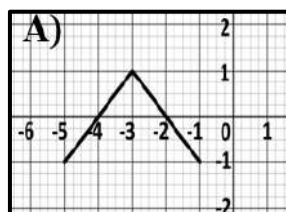
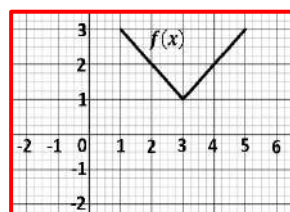
- A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$

50. Which of the following is true ?

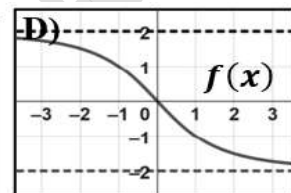
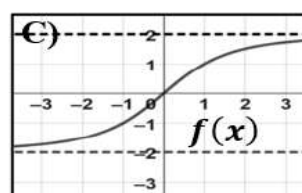
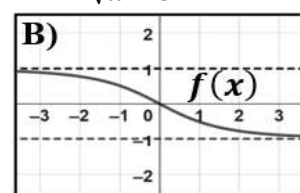
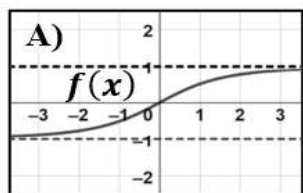
- A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$

Choose the correct option two marks for each right answer .

- Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$
 A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$
- Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$
 A) 27 B) 28 C) 30 D) 31
- In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?
 A) 100 m B) 150 m C) 96 m D) 125 m
- Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.
 A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$
- Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x - 1))$



- which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
- If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x + 1)$?
 A) $-3x(x + 1)$ B) $(x + 1)^2$ C) $-(x + 1)$ D) $3(x + 1)$
- Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$



- Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2-3x+2}{x^2-2x}$ B) $f(x) = \frac{x^2-x-6}{x^2+2x}$ C) $f(x) = \frac{x^2-3x+2}{x^2+2x}$ D) $f(x) = \frac{x^2-x-6}{x^2-2x}$
- Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$
 A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$

- Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

- A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$

- Which of the following function is differentiable at $x = 0$

A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$

- If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :

- A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$

- Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$

- A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$

- Find the critical value of the function $f(x) = xe^{-x}$

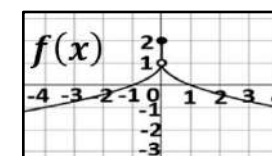
- A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$

- Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$

- A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2

- Use the given graph on the right, Which of the following is true ?

- A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
 C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$



- The range of which of the following functions is $[1, +\infty[$?

- A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x - 1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$

- If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?

- A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$

- Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$

- A) 1 B) -1 C) -3 D) 5

- If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$

- A) 0 B) 2 C) 4 D) -1

- Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$

where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$

- A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$

- If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$

Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$

- A) -27 B) -18 C) -12 D) 36

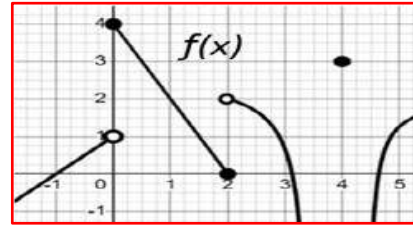
24. The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :

- A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$

25. Use the given graph on the right, to find the result of

$$\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$$

A) 7 B) 3
C) 5 D) 1



26. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$

A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$

27. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$

- A) 2 B) 1 C) 0 D) 4

28. The result of $\int_{-1}^1 (1 - |x|) dx$ is :

- A) 3 B) 0 C) 1 D) 2

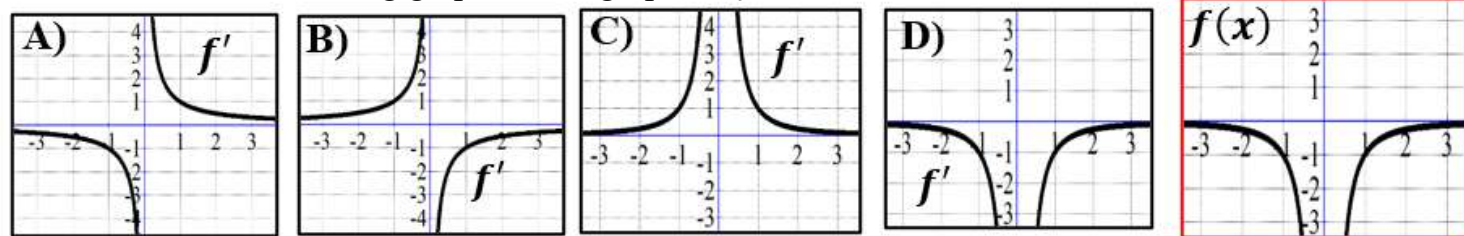
29. The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :

- A) $]4, +\infty[$ B) $]3, +\infty[$ C) $] -\infty, 4[$ D) $] -\infty, 3[$

30. The result of $\int 2x \sin x dx$ is :

- A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

31. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?



32. Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$

- A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$

33. Which of the following is true ?

- A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$

34. What is the domain of the function $f(x) = \frac{5}{|x+4|}$

- A) $] -\infty, +\infty[$ B) $] -4, +\infty[$ C) $] -\infty, -4[\cup] -4, +\infty[$ D) $] 0, +\infty[$

35. Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$

- A) $\frac{2}{9}$ B) $\frac{-2}{9}$ C) $\frac{2}{3}$ D) $\frac{-2}{3}$

36. Which function has exactly one local extrema ?

- A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$

37. If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$

- A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$

38. Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$

- A) $]0, \frac{\pi}{2}[$ B) $]\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $]\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$

39. Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$

- A) $(3, 2)$ B) $(-3, 0)$ C) $(1, 2)$ D) $(0, 4)$

40. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2 - 4}}$

- A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None

41. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$

- A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$

42. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)

- A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist

43. Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x} + 1}{\sqrt{x} + 5}$

- A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0

44. If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$

- A) -4 B) 4 C) 2 D) -2

45. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$

- A) $\frac{1}{4}$ B) $\frac{-1}{4}$ C) 1 D) -1

46. Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.

- A) $(0, 1)$ B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$

47. Which of the following function the inflection point is $(0, 0)$?

- A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$

48. Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$

- A) $(1, 1)$ B) $(0, 0)$ C) $(2, 4)$ D) $(\frac{1}{2}, \frac{1}{4})$

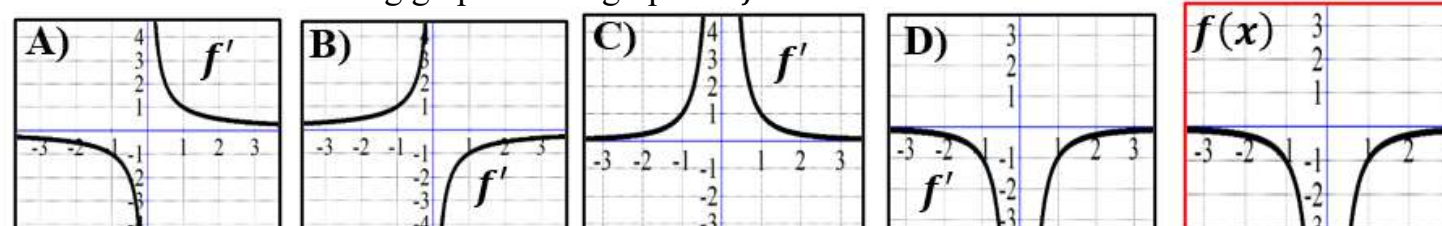
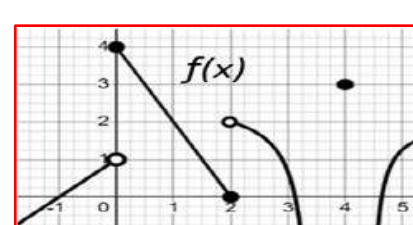
49. Which the following equation is symmetric with respect to the y-axis?

- A) $x^2 y + x = x^3 y$ B) $x^2 + y = x^4 y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$

50. A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 . At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?

- A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s

Choose the correct option two marks for each right answer .

- If $\int_1^2 f(x)dx = 6$ and $\int_2^4 f(x)dx = -4$ then find the value of $2\int_4^1 f(x)dx$
 A) -4 B) 4 C) 2 D) -2
- In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?
 A) 100 m B) 150 m C) 96 m D) 125 m
- The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?

- Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$
 A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$
- Use the given graph on the right, to find the result of $\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$

 A) 7 B) 3
 C) 5 D) 1
- Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) (1, 1) B) (0, 0) C) (2, 4) D) $(\frac{1}{2}, \frac{1}{4})$
- Which function has exactly one local extrema ?
 A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$
- which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
- Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2
- Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$
 A) $]0, \frac{\pi}{2}[$ B) $[\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $[\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup [\frac{\pi}{2}, \frac{3\pi}{2}[$
- The range of which of the following functions is $[1, +\infty[$?
 A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x-1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$

12. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?

- A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$

13. Which the following equation is symmetric with respect to the y-axis?

- A) $x^2y + x = x^3y$ B) $x^3 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$

14. Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x-axis and the two vertical lines $x = 0$, $x = 3$

- A) 27 B) 28 C) 30 D) 31

15. Which of the following function is differentiable at $x = 0$

- A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$

16. If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :

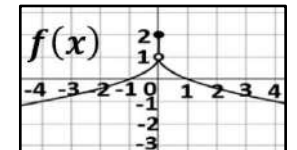
- A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$

17. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x + 1)$?

- A) $-3x(x + 1)$ B) $(x + 1)^2$ C) $-(x + 1)$ D) $3(x + 1)$

18. Use the given graph on the right, Which of the following is true ?

- A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
 C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$



19. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2 - 4}}$

- A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None

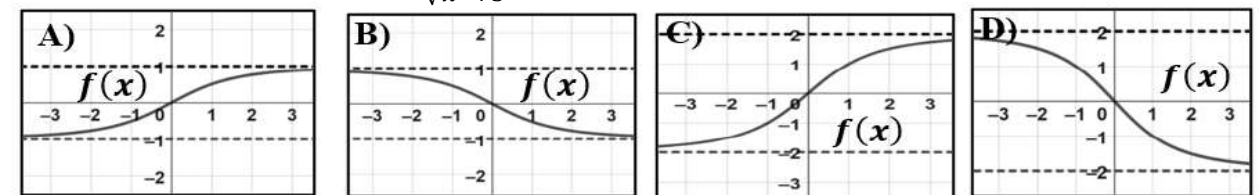
20. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$

- A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = \frac{-2}{3}$

21. Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.

- A) (0, 1) B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$

22. Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2 + 3}}$



23. Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$

- A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$

24. Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$

- A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$

25. If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$

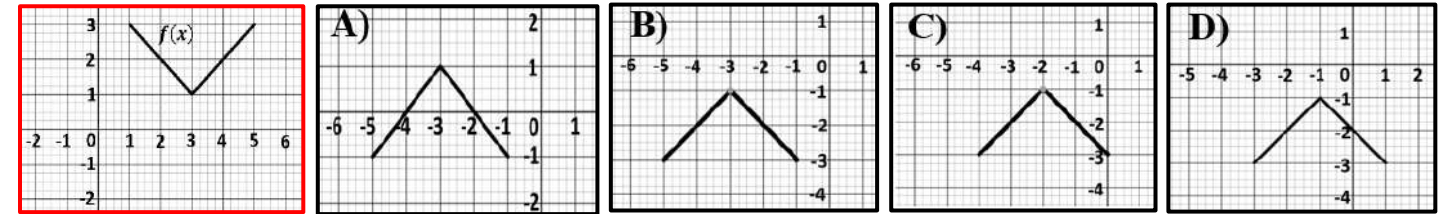
- A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$

26. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$
 A) 0 B) 2 C) 4 D) -1
27. The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :
 A) $]4, +\infty[$ B) $]3, +\infty[$ C) $] -\infty, 4[$ D) $] -\infty, 3[$
28. Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
 A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$
29. Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

 A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$
30. A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 . At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck?
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31. The result of $\int 2x \sin x dx$ is :
 A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
 C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$
32. The result of $\int_{-1}^1 (1 - |x|) dx$ is :
 A) 3 B) 0 C) 1 D) 2
33. Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x} + 1}{\sqrt{x} + 5}$
 A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0
34. Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
35. Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$
 A) 1 B) -1 C) -3 D) 5
36. Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
37. What is the domain of the function $f(x) = \frac{5}{|x+4|}$
 A) $] -\infty, +\infty[$ B) $] -4, +\infty[$ C) $] -\infty, -4[\cup] -4, +\infty[$ D) $] 0, +\infty[$
38. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$
 A) 2 B) 1 C) 0 D) 4

39. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x - 1))$



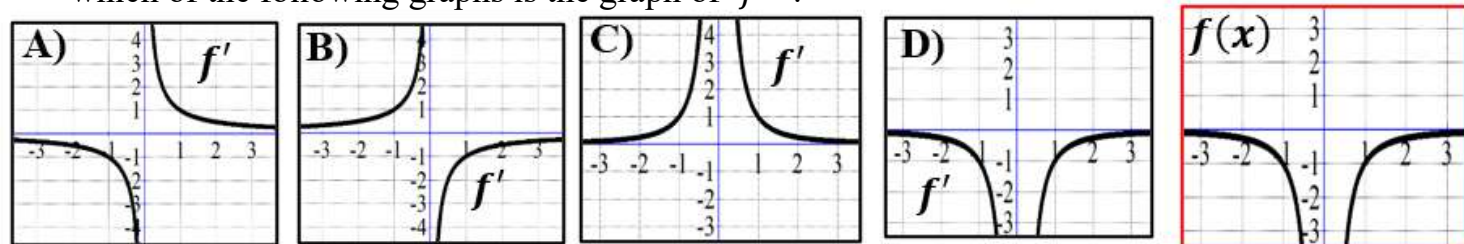
40. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.
 A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$
41. What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$
 A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1
42. Which of the following is true?
 A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$
43. Which of the following function the inflection point is $(0, 0)$?
 A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$
44. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$
 A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$
45. If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$ Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
 A) -27 B) -18 C) -12 D) 36
46. Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2 - 3x + 2}{x^2 - 2x}$ B) $f(x) = \frac{x^2 - x - 6}{x^2 + 2x}$ C) $f(x) = \frac{x^2 - 3x + 2}{x^2 + 2x}$ D) $f(x) = \frac{x^2 - x - 6}{x^2 - 2x}$
47. The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
 A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$
48. Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$
 A) $(3, 2)$ B) $(-3, 0)$ C) $(1, 2)$ D) $(0, 4)$
49. Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)
 A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist
50. Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$
 A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$

Choose the correct option two marks for each right answer .

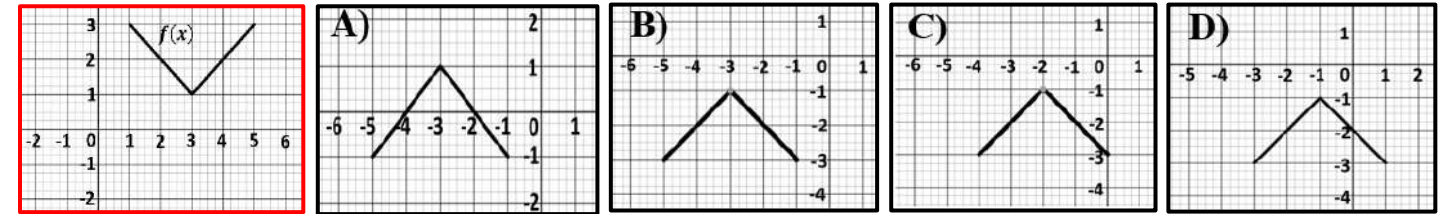
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 - Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$
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 A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$
 - Use the given graph on the right, Which of the following is true ?
 A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
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-
- which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
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 - If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$
 A) -4 B) 4 C) 2 D) -2
 - Which of the following function is differentiable at $x = 0$
 A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$
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 A) 1 B) -1 C) -3 D) 5
 - What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$
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 - Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
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 - Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$
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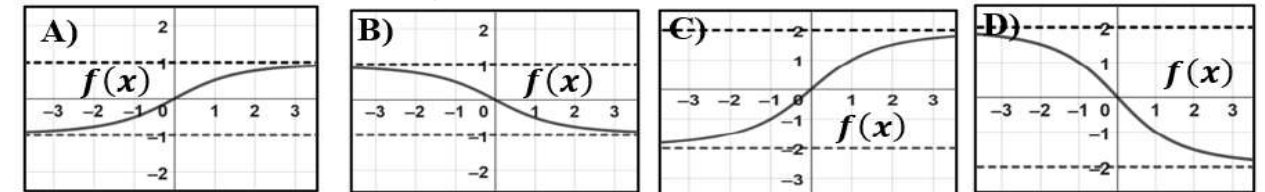
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29. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?
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 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2
34. Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x+1}}{\sqrt{x+5}}$
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 A) $]4, +\infty[$ B) $]3, +\infty[$ C) $] -\infty, 4[$ D) $] -\infty, 3[$
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 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
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42. Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$



43. Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) (1, 1) B) (0, 0) C) (2, 4) D) $(\frac{1}{2}, \frac{1}{4})$

44. Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$

45. The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :

- A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$

46. If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
 A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$

47. Which the following equation is symmetric with respect to the y-axis?

- A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$

48. Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$

- A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$

49. Which function has exactly one local extrema?

- A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$

50. Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

- A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$

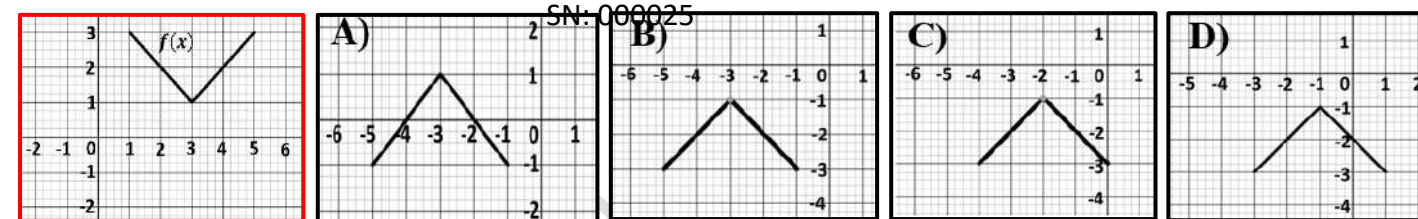
Choose the correct option two marks for each right answer .

- Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)
 A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist
- The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :
 A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$
- Which of the following function is differentiable at $x = 0$
 A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$
- Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$
 A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$
- Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.
 A) $(0, 1)$ B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$
- If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?
 A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$
- Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) $(1, 1)$ B) $(0, 0)$ C) $(2, 4)$ D) $(\frac{1}{2}, \frac{1}{4})$
- Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
- Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$, the x -axis and the two vertical lines $x = 0$, $x = 3$
 A) 27 B) 28 C) 30 D) 31
- If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
 A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$
- Which function has exactly one local extrema ?
 A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x - 2|$ D) $f(x) = x^3 - 12x$
- The result of $\int_{-1}^1 (1 - |x|) dx$ is :
 A) 3 B) 0 C) 1 D) 2
- Which of the following function the inflection point is $(0,0)$?
 A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$

14. Which of the following is true ?

A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$

15. Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x-1))$

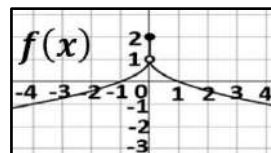


- Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
- Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2 - 3x + 2}{x^2 - 2x}$ B) $f(x) = \frac{x^2 - x - 6}{x^2 + 2x}$ C) $f(x) = \frac{x^2 - 3x + 2}{x^2 + 2x}$ D) $f(x) = \frac{x^2 - x - 6}{x^2 - 2x}$
- The decreasing interval of the function $f(x) = 4 - |x - 3|$ is :
 A) $]4, +\infty[$ B) $]3, +\infty[$ C) $] -\infty, 4[$ D) $] -\infty, 3[$
- If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$
 A) 2 B) 1 C) 0 D) 4
- If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$ Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$
 A) -27 B) -18 C) -12 D) 36
- If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$
 A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$
- Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$
 A) $]0, \frac{\pi}{2}[$ B) $]\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $]\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup]\frac{\pi}{2}, \frac{3\pi}{2}[$
- Determine the value of a and b such that the function is continuous everywhere.

$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

 A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$
- What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2, 0)$
 A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1
- In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?
 A) 100 m B) 150 m C) 96 m D) 125 m
- which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2 - 6x + 9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non - removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$

27. Use the given graph on the right, Which of the following is true ?



- A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$

28. The result of $\int 2x \sin x dx$ is :

- A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$

29. Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$

- A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x - 2|$

30. A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 . At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?

- A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s

31. Which the following equation is symmetric with respect to the y-axis?

- A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$

32. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$

- A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$

33. If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x + 1)$?

- A) $-3x(x + 1)$ B) $(x + 1)^2$ C) $-(x + 1)$ D) $3(x + 1)$

34. Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$

- A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$

35. If $\int_1^2 f(x) dx = 6$ and $\int_2^4 f(x) dx = -4$ then find the value of $2 \int_4^1 f(x) dx$

- A) -4 B) 4 C) 2 D) -2

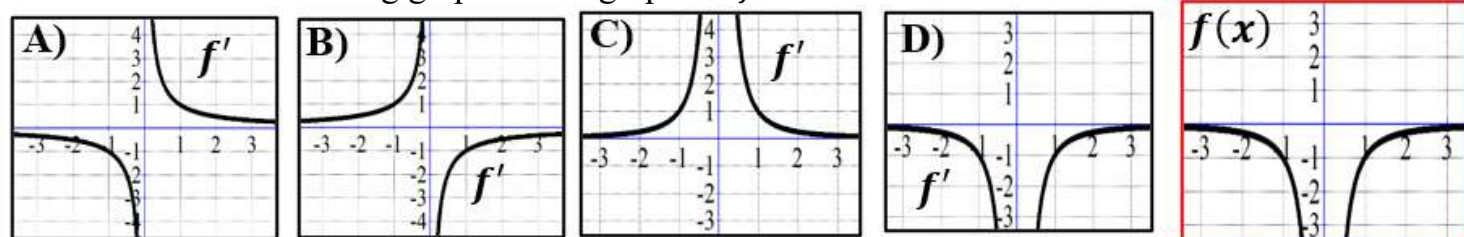
36. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.

- A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$

37. What is the domain of the function $f(x) = \frac{5}{|x+4|}$

- A) $]-\infty, +\infty[$ B) $]-4, +\infty[$ C) $]-\infty, -4[\cup]-4, +\infty[$ D) $]0, +\infty[$

38. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?



39. Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$

- A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = -\frac{2}{3}$

40. Which the following point on the line with the slope is undefined and passes through the point $(-3, 4)$

- A) $(3, 2)$ B) $(-3, 0)$ C) $(1, 2)$ D) $(0, 4)$

41. Find the result of $\lim_{x \rightarrow +\infty} \frac{x + \sqrt{x} + 1}{\sqrt{x} + 5}$

- A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0

42. Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$

- A) 1 B) -1 C) -3 D) 5

43. The range of which of the following functions is $[1, +\infty[$?

- A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x - 1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$

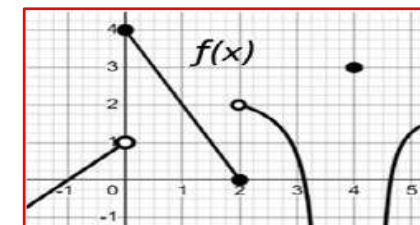
44. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2 - 4}}$

- A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) *None*

45. Use the given graph on the right, to find the result of

$$\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$$

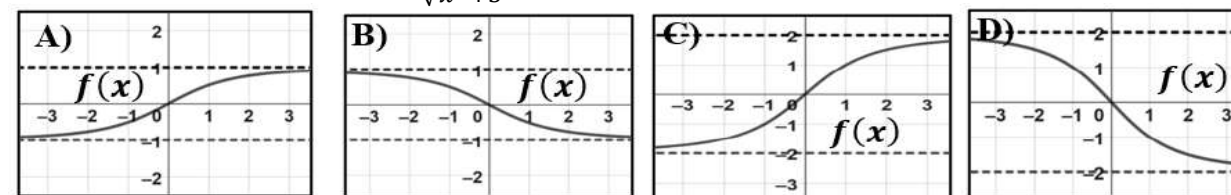
- A) 7 B) 3
C) 5 D) 1



46. Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$

- A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2

47. Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2 + 3}}$



48. Find the second derivative of the function $f(x) = 2 \sin 2x \cos 2x$

- A) $2 \sin 2x$ B) $2 \cos 4x$ C) $-16 \sin 4x$ D) $8 \sin 4x$

49. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$

- A) 0 B) 2 C) 4 D) -1

50. Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$

- A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$

Choose the correct option two marks for each right answer .

- The result of $\int 2x \sin x dx$ is :
 A) $2\sin x - 2x \cos x + c$ B) $2\cos x - 2x \sin x + c$
 C) $2\cos x + 2x \sin x + c$ D) $-x^2 \cos x + c$
- Which of the following function is differentiable at $x = 0$
 A) $f(x) = |x|$ B) $f(x) = \frac{1}{x^2}$ C) $f(x) = x^{\frac{2}{5}}$ D) $f(x) = \begin{cases} x^2 \sin \frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$
- Which the following point on the line with the slope is undefined and passes through the point $(-3,4)$
 A) $(3,2)$ B) $(-3,0)$ C) $(1,2)$ D) $(0,4)$
- Find the value of $f(0)$ If $f'(x) = 2 \sin x + 3 \cos x$, where the graph of $f(x)$ passes through the point $(\pi, 1)$
 A) 1 B) -1 C) -3 D) 5
- Determine the value of a and b such that the function is continuous everywhere.

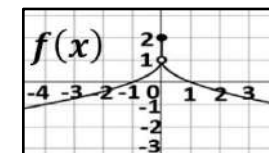
$$f(x) = \begin{cases} 3 & x \leq 1 \\ ax + 3 & 1 < x \leq 4 \\ bx + 1 & x > 4 \end{cases}$$

 A) $a = 0, b = \frac{1}{2}$ B) $a = 1, b = \frac{1}{2}$ C) $a = 0, b = 2$ D) $a = 1, b = -1$
- If $f(x) = 3x^2 - 3x$ Which of the following equals $f(1) - f(x+1)$?
 A) $-3x(x+1)$ B) $(x+1)^2$ C) $-(x+1)$ D) $3(x+1)$
- Find the area of the region bound by the graph of the function $f(x) = 3x^2 + 1$,the x-axis and the two vertical lines $x = 0$, $x = 3$
 A) 27 B) 28 C) 30 D) 31
- Find the critical value of the function $f(x) = xe^{-x}$
 A) $x = -1$ B) $x = e$ C) $x = 0$ D) $x = 1$
- What is the slope of the normal line to the curve $4x^2 - 8xy + 9y^2 = 16$ at the point $(-2,0)$
 A) $\frac{1}{4}$ B) $-\frac{1}{4}$ C) 1 D) -1
- The result of $\int_{-1}^1 (1 - |x|) dx$ is :
 A) 3 B) 0 C) 1 D) 2
- If $g(x) = \begin{cases} |x| + 1 & x \geq 1 \\ -x + 1 & x < 1 \end{cases}$ then the value of $g(b^2 + 1)$ is :
 A) b^2 B) $-b^2$ C) $b^2 + 4$ D) $b^2 + 2$
- In a fireworks festival, a rocket is launched upward from the height of 2.5 meter of the ground, at an initial velocity of 49 meter per second. What is the highest point the rocket can reach?
 A) 100 m B) 150 m C) 96 m D) 125 m

- Which of the following functions is discontinuous at $x = -2$ and it has a removable discontinuity at $x = -2$
 A) $f(x) = \frac{x^2 - 3x + 2}{x^2 - 2x}$ B) $f(x) = \frac{x^2 - x - 6}{x^2 + 2x}$ C) $f(x) = \frac{x^2 - 3x + 2}{x^2 + 2x}$ D) $f(x) = \frac{x^2 - x - 6}{x^2 - 2x}$

- Use the given graph on the right, which of the following is true ?

- A) $f'(-1) < f'(1)$ B) $f'(-2) = -f'(2)$
 C) $f'(0) = 2$ D) $f(x)$ has inflection point at $x = 0$



- Assume that x and y are two differentiable functions of a variable t , if $x^3 + y^2 = 1$ find $\frac{dy}{dt}$ where $y = 3$ knowing that $\frac{dx}{dt} = \frac{1}{2}$

- A) $\frac{dy}{dt} = -1$ B) $\frac{dy}{dt} = 1$ C) $\frac{dy}{dt} = -2$ D) $\frac{dy}{dt} = 8$

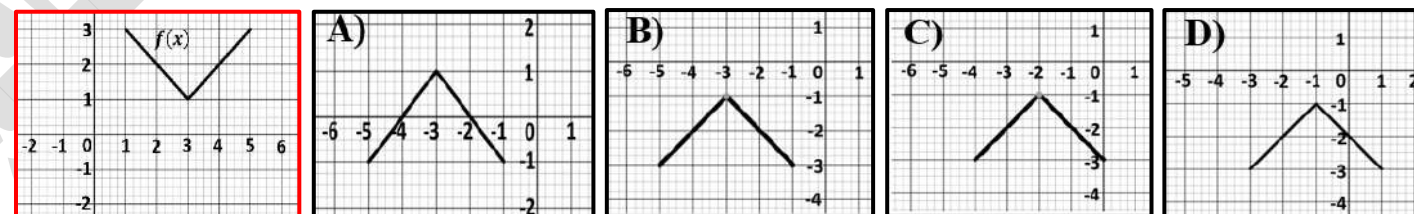
- Find the result of $\lim_{x \rightarrow 0} \frac{\frac{2}{3-x} - \frac{2}{3}}{x}$

- A) $\frac{2}{9}$ B) $-\frac{2}{9}$ C) $\frac{2}{3}$ D) $-\frac{2}{3}$

- The result of $\int \frac{2}{\sqrt[3]{3x}} dx$ is :

- A) $\sqrt[3]{3x} + c$ B) $\sqrt[3]{(3x)^2} + c$ C) $\sqrt[3]{(3x)^5} + c$ D) $\sqrt[3]{x} + c$

- Use the given graph of the function $f(x)$ to determine the graph of the function $y = -f(-(x-1))$



- Find the concave interval of the function $f(x) = \frac{x}{2} + \cos x$ on the interval $]0, 2\pi[$

- A) $]0, \frac{\pi}{2}[$ B) $[\frac{\pi}{2}, \frac{3\pi}{2}[$ C) $[\frac{3\pi}{2}, 2\pi[$ D) $]0, \frac{\pi}{2}[\cup [\frac{\pi}{2}, \frac{3\pi}{2}[$

- Find the equation of the horizontal asymptote of the function $h(x) = \frac{3x^2 - 2x^3}{x^3 + x^2 - 1}$

- A) $y = 3$ B) $y = -2$ C) $y = \frac{2}{3}$ D) $y = -\frac{2}{3}$

- Which the following equation is symmetric with respect to the y-axis?

- A) $x^2y + x = x^3y$ B) $x^2 + y = x^4y$ C) $y = (3x + 1)^2 + 6x$ D) $y = \frac{x^2 - x}{\tan x}$

- If f and g are two differentiable functions and $h = g \circ f$ then find the result of $h'(-1)$

Knowing that $\lim_{x \rightarrow -2} \frac{g(x) - g(-2)}{x + 2} = -4$ and the tangent line to the graph of a function f at the point $(-1, -2)$ passes through the point $(-2, -5)$

- A) -27 B) -18 C) -12 D) 36

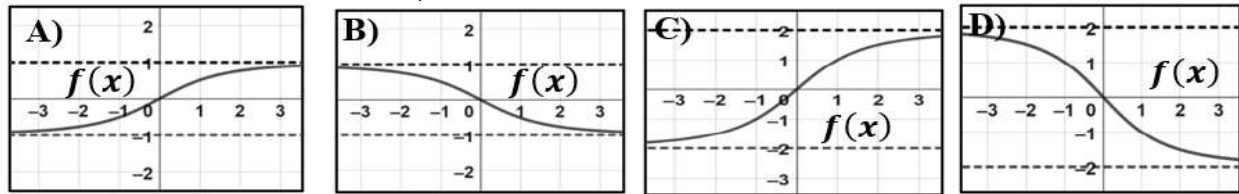
- What is the domain of the function $f(x) = \frac{5}{|x+4|}$

- A) $] -\infty, +\infty[$ B) $] -4, +\infty[$ C) $] -\infty, -4[\cup] -4, +\infty[$ D) $] 0, +\infty[$

- Find the result of $\lim_{x \rightarrow 0} \frac{\ln(x+1)^2}{2x}$ (Use L'Hôpital's rule)

- A) $\frac{1}{2}$ B) 1 C) 4 D) does not exist

25. Find the point on the graph of the parabola $f(x) = x^2$ that is closest to the point $(2, \frac{1}{2})$
 A) (1, 1) B) (0, 0) C) (2, 4) D) $(\frac{1}{2}, \frac{1}{4})$
26. Find the y-intercept of the function $f(x) = \frac{x}{\sqrt{x^2-4}}$
 A) $y = 0$ B) $y = \mp 2$ C) $y = 4$ D) None
27. If $f(x) = e^x(\sin x + \cos x)$ then find the value of $f'(0)$
 A) 2 B) 1 C) 0 D) 4
28. If $\int_1^2 f(x)dx = 6$ and $\int_2^4 f(x)dx = -4$ then find the value of $2\int_4^1 f(x)dx$
 A) -4 B) 4 C) 2 D) -2
29. The range of which of the following functions is $[1, +\infty[$?
 A) $f(x) = \frac{1}{x-1}$ B) $f(x) = \ln(x-1)$ C) $f(x) = 2\sqrt{x+2} + 1$ D) $f(x) = \sin x$
30. Find the result of $\lim_{x \rightarrow +\infty} \frac{x+\sqrt{x}+1}{\sqrt{x}+5}$
 A) $+\infty$ B) $\frac{1}{5}$ C) 1 D) 0
31. Which function has exactly one local extrema ?
 A) $f(x) = x^3 + 12x - 1$ B) $f(x) = \ln x$ C) $f(x) = |x-2|$ D) $f(x) = x^3 - 12x$
32. If $f(x) = 1 - 4x$ and $g(x) = x \sin x - \cos x$ then find the result of $(f \circ g)(\frac{\pi}{2})$
 A) $1 - 2\pi$ B) $1 - \pi$ C) $1 - 4\pi$ D) $\pi + 1$
33. Use the intercepts, symmetry, asymptotes, first and second derivative test to determine the graph of the function $f(x) = \frac{-x}{\sqrt{x^2+3}}$

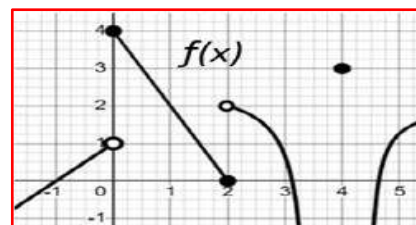


34. Find the mean value of the function $f(x) = 3 - x^2$ over the interval $[-2, 2]$
 A) $\frac{8}{3}$ B) 4 C) 16 D) $\frac{5}{3}$
35. Find the value of k so that the line $y = 2kx - 3$ is tangent to the function $f(x) = \frac{-3}{x}$
 A) 2 B) 6 C) $\frac{3}{5}$ D) $\frac{3}{8}$
36. If $f(x) = x^2 - 2x$ find the value of $\lim_{\Delta x \rightarrow 0} \frac{f(1+\Delta x) - f(1)}{\Delta x}$
 A) 0 B) 2 C) 4 D) -1
37. Which the following functions the value of $\lim_{x \rightarrow 0} f(x) = 0$
 A) $f(x) = \sin \frac{1}{x}$ B) $f(x) = \frac{\sin^2 3x}{x}$ C) $f(x) = \frac{\sin 2x}{x}$ D) $f(x) = \frac{x}{1 - \cos x}$

38. Use the given graph on the right, to find the result of

$$\lim_{x \rightarrow 0^-} f(x) + \lim_{x \rightarrow 1} f(x) - \lim_{x \rightarrow 2^+} f(x)$$

- A) 7 B) 3
 C) 5 D) 1



39. A car that had stopped at the traffic lights started at an acceleration of 4 m/s^2 . At the same time a truck overtook the car at a constant velocity of 16 m/s . What will the velocity of the car be when it overtook by the truck ?
 A) 45 m/s B) 128 m/s C) 60 m/s D) 32 m/s
40. Find the value of $g(b)$. Knowing that $\lim_{x \rightarrow -3} \frac{\sqrt{x+4}-1}{x+3} = b$ and $g'(2) = \lim_{x \rightarrow 2} \frac{(4x-x^2)-4}{x-2}$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{7}{4}$ D) 2
41. which of the following is false for the function $f(x) = \frac{-(x-3)}{x^2-6x+9}$
 A) The function $f(x)$ is discontinuous at $x = 3$ and non-removable B) $f'(2) = 1$
 C) The function $f(x)$ has vertical asymptote at $x = 3$ D) $\lim_{x \rightarrow 3^-} f(x) = -\infty$
42. The decreasing interval of the function $f(x) = 4 - |x-3|$ is :
 A) $]4, +\infty[$ B) $]3, +\infty[$ C) $] -\infty, 4[$ D) $] -\infty, 3[$
43. If $\int_{-1}^c x^2 dx = \lim_{x \rightarrow 0} \frac{2x + \sin 5x}{-3x}$ then find the value of c ?
 A) $c = 2$ B) $c = -3$ C) $c = 0$ D) $c = -2$
44. Determine the function $p(x)$ where the function $f(x) = \frac{p(x)}{x-2}$ has vertical asymptote at $x = 2$
 A) $p(x) = x^3 - 8$ B) $p(x) = x^2 - 2x + 4$ C) $p(x) = x^2 - 4$ D) $p(x) = |x-2|$
45. Find the equation of the line that passes through the point $(-1, 3)$ and that is parallel to the x-axis.
 A) $x + 1 = 0$ B) $y - 3 = 0$ C) $x = 1$ D) $y = -3$
46. Find the second derivative of the function $f(x) = 2\sin 2x \cos 2x$
 A) $2\sin 2x$ B) $2\cos 4x$ C) $-16\sin 4x$ D) $8\sin 4x$
47. Which of the following is true ?
 A) $\lim_{x \rightarrow -\infty} \frac{2\sin 3x}{5x} = \frac{-6}{5}$ B) $\lim_{x \rightarrow +\infty} \cos 2x = 0$ C) $\lim_{x \rightarrow -\infty} \cos \frac{1}{x} = 1$ D) $\lim_{x \rightarrow -\infty} \frac{|x+1|}{2x-4} = \frac{1}{2}$
48. Which of the following function the inflection point is $(0, 0)$?
 A) $f(x) = |x|$ B) $f(x) = x^{\frac{2}{3}}$ C) $f(x) = \sqrt[3]{x}$ D) $f(x) = x^4$
49. Find the point on the graph of the function $f(x) = x + \cos x$ in the interval $0 \leq x \leq 2\pi$ where the tangent line to the graph of the function f is horizontal.
 A) $(0, 1)$ B) $(\pi, \pi - 1)$ C) $(\frac{\pi}{2}, \frac{\pi}{2})$ D) $(\frac{3\pi}{2}, 0)$
50. The graph on the right shows the curve of the function f , which of the following graphs is the graph of f' ?

