

Form B : Instructions: (33 points). Solve each of the following problems and choose the correct answer :

1. $\log_2 8 - \log_2 4 =$

- (a) 1 *
- (b) 2
- (c) 0
- (d) -1

2. If $\ln(2x - 9) = 0$, then $x =$

- (a) $\frac{9}{2}$
- (b) 4
- (c) -5
- (d) 5 *

3. $\sin(\cos^{-1} \frac{3}{x}) =$

- (a) $\frac{x}{\sqrt{x^2 - 9}}$
- (b) $\frac{x}{\sqrt{9 - x^2}}$
- (c) $\frac{\sqrt{x^2 - 9}}{x}$ *
- (d) $\frac{\sqrt{9 - x^2}}{x}$

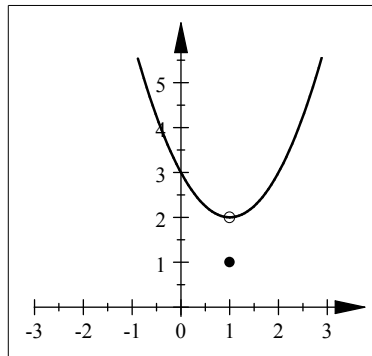
4. The domain of the function $f(x) = \cos^{-1}(3x + 4)$ is

- (a) $[-\frac{5}{3}, -1]$ *
- (b) $(-\frac{5}{3}, -1)$
- (c) $[1, \frac{5}{3}]$
- (d) $(1, \frac{5}{3})$

5. The exact value of the expression $e^{-2\ln 3}$ is

- (a) -6
- (b) 9
- (c) $\frac{1}{9}$ *
- (d) $\frac{1}{6}$

6. If $f(x)$ is the function whose graph is shown ,



then $\lim_{x \rightarrow 1} f(x) =$

- (a) 3
- (b) 1
- (c) 2 *
- (d) Does not exist.

7. $\lim_{x \rightarrow -3} \frac{x^2 + 2x - 3}{x + 3} =$

- (a) -4 *
- (b) -1
- (c) -2
- (d) 4

8. If $\lim_{x \rightarrow 3} \frac{f(x) - 2}{x^2} = 2$, then $\lim_{x \rightarrow 3} f(x) =$

- (a) 0
- (b) 20 *
- (c) 16
- (d) 4

9. $\lim_{x \rightarrow 3} \frac{(x-1)^2 - 4}{x-3} =$

- (a) ∞
- (b) 2
- (c) -4
- (d) 4 *

10. If $5(x-1) \leq f(x) \leq x^3 + x^2 - 2$, then $\lim_{x \rightarrow -3} f(x) =$

- (a) 34
- (b) 20
- (c) -20 *
- (d) Does not exist.

11. $\lim_{x \rightarrow 0} \frac{\sqrt{25+x} - 5}{x} =$

- (a) $\frac{1}{10}$ *
- (b) $\frac{1}{25}$
- (c) 0
- (d) ∞

12. $\lim_{x \rightarrow \frac{\pi}{2}} x \sin x =$

- (a) $\frac{\pi}{2}$ *
- (b) 0
- (c) $-\frac{\pi}{2}$
- (d) Does not exist.

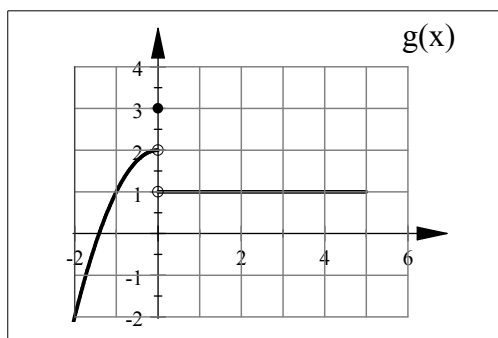
13. $\lim_{x \rightarrow 2} \frac{x-2}{x^3-8} =$

- (a) 2
- (b) $\frac{1}{12}$ *
- (c) $\frac{1}{4}$
- (d) Does not exist.

14. $\lim_{x \rightarrow -4} \frac{\frac{1}{4} + \frac{1}{x}}{4+x} =$

- (a) $\frac{1}{16}$
- (b) $-\frac{1}{16}$ *
- (c) 16
- (d) -16

15. If $g(x)$ is the function whose graph is shown,



then $\lim_{x \rightarrow 0^+} g(x) =$

- (a) 3
- (b) 2
- (c) 1 *
- (d) Does not exist.

16. If $f(x) = \begin{cases} -3x+1 & \text{if } x > 1 \\ x+2 & \text{if } x < 1 \end{cases}$, then $\lim_{x \rightarrow 1^-} f(x) =$

- (a) -2
- (b) 3 *
- (c) 2
- (d) Does not exist.

17. If $f(x) = \frac{x^2 - 4}{|x - 2|}$, then $\lim_{x \rightarrow 2^-} f(x) =$

- (a) 16
- (b) 4
- (c) -4 *
- (d) Does not exist.

18. $\lim_{x \rightarrow 4} \frac{\sin(x-4)}{2x-8} =$

- (a) 0
- (b) 1
- (c) $-\frac{1}{2}$
- (d) $\frac{1}{2}$ *

19. $\lim_{\theta \rightarrow 0} \frac{\tan \theta}{2\theta + \sin \theta} =$

- (a) 0
- (b) 1
- (c) $\frac{1}{3}$ *
- (d) Does not exist.

20. $\lim_{x \rightarrow \infty} \frac{x-4}{x^2-x-12} =$

(a) 0 *

(b) $\frac{1}{3}$

(c) 4

(d) ∞

21. $\lim_{x \rightarrow -\infty} \frac{\sqrt{x^2-2}}{3x-5} =$

(a) $\frac{1}{3}$

(b) $-\frac{1}{3}$ *

(c) ∞

(d) $-\infty$.

22. The horizontal asymptote of $f(x) = \frac{7x^3 - 5x^2 - 3}{8x^3 + x}$ is

(a) $y = \frac{7}{8}$ *

(b) $x = \frac{7}{8}$

(c) $y = -\frac{7}{8}$

(d) $x = -\frac{7}{8}$

23. The function $f(x) = \frac{-3x^4 - 4x^2 + 35}{x^3 - 8}$ does not have a horizontal asymptote.

(a) True *

(b) False

24. $\lim_{x \rightarrow -\infty} (5x^2 + 2x + 7) =$

(a) $-\infty$

(b) 5

(c) 7

(d) ∞ *

25. $\lim_{x \rightarrow -\infty} \cos\left(\frac{1}{2x+\pi}\right) =$

(a) 1 *

(b) $\frac{\pi}{2}$

(c) 0

(d) Does not exist.

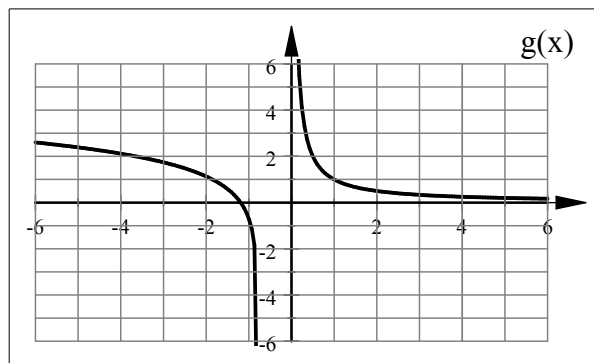
26. $\lim_{x \rightarrow 3^-} \frac{2x}{x-3} =$

- (a) ∞
- (b) $-\infty$ *
- (c) 2
- (d) 6

27. The vertical asymptote(s) of $f(x) = \frac{x-3}{x^2+x-12}$ is (are)

- (a) $y = 3$, $y = -4$
- (b) $x = 3$, $x = -4$
- (c) $y = -4$
- (d) $x = -4$ *

28. The horizontal asymptote(s) of the following function is (are)



- (a) $y = 0$, $y = 3$ *
- (b) $y = -1$, $y = 0$
- (c) $x = 0$, $x = 3$
- (d) $x = 0$

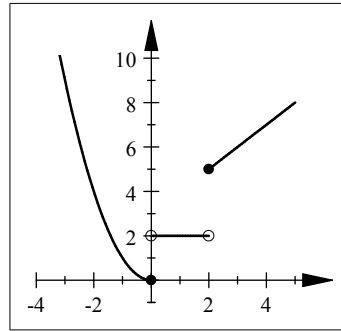
29. The function $f(x) = \begin{cases} x-1 & \text{if } x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases}$ is continuous at $a = 0$

- (a) True
- (b) False *

30. The function $f(x) = \begin{cases} k^2x - 3x & \text{if } x \geq 2 \\ 6x & \text{if } x < 2 \end{cases}$ is continuous on \mathbb{R} if

- (a) $k = \pm 3$ *
- (b) $k = \pm 9$
- (c) $k = 9$
- (d) $k = -9$.

31. If $f(x)$ is the function whose graph is shown below ,



then $f(x)$ is

- (a) continuous from the right at $x = 0$
- (b) discontinuous from the right at $x = 0$ *
- (c) continuous from the left at $x = 2$
- (d) discontinuous from the right at $x = 2$

32. The function $f(x) = \tan x$ is discontinuous at $x =$

- (a) $(2n+1)\pi$, $n \in Z$
- (b) $(2n+1)\frac{\pi}{2}$, $n \in Z$ *
- (c) $n\pi$, $n \in Z$
- (d) $\frac{n\pi}{2}$, $n \in Z$

33. The function $f(x) = \frac{\sqrt{4-x^2}}{x-2}$ is continuous on

- (a) $[-2, 2]$
- (b) $[-2, 2)$ *
- (c) $(-\infty, -2] \cup (2, \infty)$
- (d) $(-\infty, -2) \cup (2, \infty)$.