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

1. $\log_2 6 - \log_2 3 =$

   (a) 0

   (b) -1

   (c) 2

   (d) 1

2. If $\ln(2x+5) = 0$, then $x =$

   (a) -2

   (b) 2

   (c) $-\frac{5}{2}$

   (d) 3

3. $\tan\left(\cos^{-1}\frac{x}{3}\right) =$

   (a) $\frac{x}{\sqrt{9-x^2}}$

   (b) $\frac{x}{\sqrt{x^2-9}}$

   (c) $\frac{\sqrt{x^2-9}}{x}$

   (d) $\frac{\sqrt{9-x^2}}{x}$

4. The domain of the function $f(x) = \sin^{-1}(3x-2)$ is

   (a) $\left[-1, -\frac{1}{3}\right]$

   (b) $\left(-1, -\frac{1}{3}\right)$

   (c) $\left[\frac{1}{3}, 1\right]$

   (d) $\left(\frac{1}{3}, 1\right)$

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

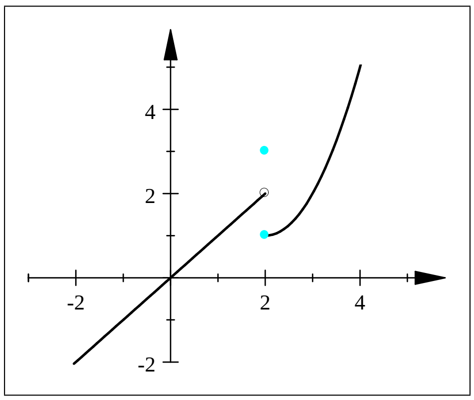
(a) $\frac{1}{8}$

(b) $\frac{1}{6}$

(c) 8

(d) -6

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



then $\lim_{x\to 2} f(x) =$

(a) 1

(b) 2

(c) 3

(d) Does not exist.

7. $\lim_{x\to 3} \dfrac{x^2 - 8x + 15}{x - 3} =$

(a) 1

(b) 8

(c) -2

(d) 2

8. If $\lim_{x\to 2} \dfrac{f\ (x)+10}{x^2} = 5$, then $\lim_{x\to 2} f(x) =$

(a) 10
(b) 15
(c) 30
(d) -5

9. $\lim_{x\to 2} \dfrac{(x-3)^2-1}{x-2} =$

(a) 2
(b) 6
(c) -2
(d) ∞

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

(a) -32
(b) 18
(c) -18
(d) Does not exist.

11. $\lim_{x\to 0} \dfrac{\sqrt{49+x}-7}{x} =$

(a) 0
(b) $\dfrac{1}{14}$
(c) $\dfrac{1}{49}$
(d) ∞

12. $\lim_{x\to \frac{\pi}{4}} \ x\cot x =$

(a) $-\dfrac{\pi}{4}$
(b) 0
(c) $\dfrac{\pi}{4}$
(d) Does not exist

13. $\lim_{x \to 3} \dfrac{x^3 - 27}{x - 3} =$

(a) 27

(b) 3

(c) 9

(d) Does not exist

14. $\lim_{x \to -5} \dfrac{\frac{1}{5} + \frac{1}{x}}{5 + x} =$

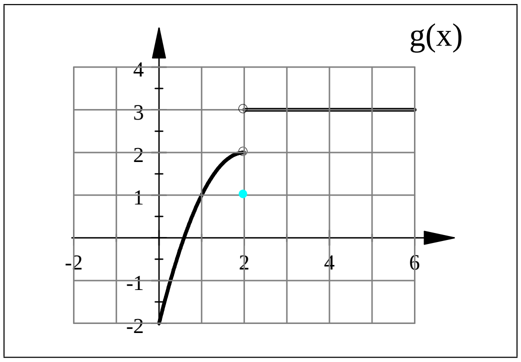
(a) $\dfrac{1}{25}$

(b) $-\dfrac{1}{25}$

(c) 25

(d) -25

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



then $\lim_{x \to 2^+} g(x) =$

(a) 1

(b) 2

(c) 3

(d) Does not exist

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

(a) 3

(b) 2

(c) -2

(d) Does not exist.

17. If $f(x) = \dfrac{x^2-4}{|x-2|}$, then $\lim\limits_{x \to 2^+} f(x) =$

(a) -4

(b) 4

(c) 16

(d) Does not exist

18. $\lim\limits_{x \to 3} \dfrac{\tan(x-3)}{5x-15} =$

(a) 0

(b) $\dfrac{1}{5}$

(c) $-\dfrac{1}{5}$

(d) 1

19. $\lim\limits_{\theta \to 0} \dfrac{\sin\theta}{\theta + \tan\theta} =$

(a) 0

(b) $\dfrac{1}{2}$

(c) 1

(d) Does not exist

20. $\lim\limits_{x \to \infty} \dfrac{x^4+6x^3}{2x^3-3x} =$

(a) 0

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

(c) 3

(d) ∞

21. $\lim_{x\to-\infty} \dfrac{\sqrt{x^2-1}}{2x+3} =$

(a) $-\dfrac{1}{2}$

(b) $\dfrac{1}{2}$

(c) ∞

(d) $-\infty$

22. The horizontal asymptote of $f(x) = \dfrac{-9x^2 - x + 2}{4x^2 + x}$ is

(a) $y = \dfrac{9}{4}$

(b) $x = \dfrac{9}{4}$

(c) $y = -\dfrac{9}{4}$

(d) $x = -\dfrac{9}{4}$

23. The function $f(x) = \dfrac{x^3 + 3x^2 - 1}{x^2 - 4}$ has a horizontal asymptote.

(a) True.

(b) False.

24. $\lim_{x\to-\infty} (2x^3 - x + 3) =$

(a) $-\infty$

(b) 3

(c) 2

(d) ∞

25. $\lim_{x\to\infty} \tan(\dfrac{1}{x-\pi}) =$

(a) $-\pi$

(b) 1

(c) 0

(d) Does not exist.

26. $\lim\limits_{x \to 3^+} \dfrac{2x}{x-3} =$

(a) ∞

(b) 6

(c) 2

(d) $-\infty$

27. The vertical asymptote(s) of $f(x) = \dfrac{x+4}{x^2+x-12}$ is (are)

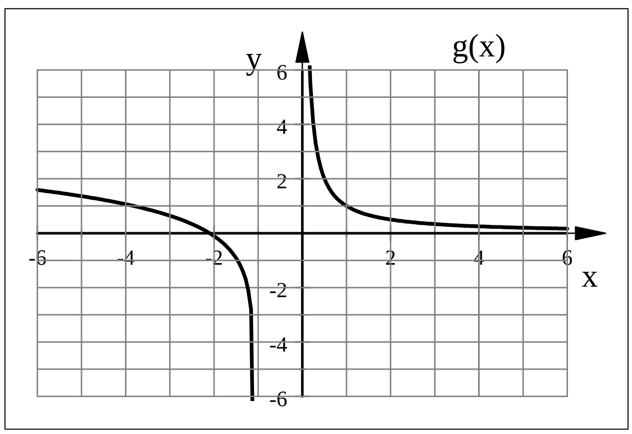
(a) $y = 3$

(b) $x = 3$

(c) $y = 3$, $y = -4$

(d) $x = 3$, $x = -4$

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



(a) $x = 2$

(b) $x = 0$, $x = 2$

(c) $y = -1$, $y = 0$

(d) $y = 0$, $y = 2$

29. The function $f(x) = \begin{cases} x^3 - 4 & \text{if} \quad x \geq 2 \\ x^2 & \text{if} \quad x < 2 \end{cases}$ is continuous at $a = 2$

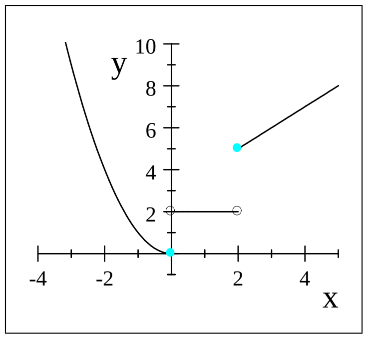
(a) Ttue

(b) False

30. The function $f(x) = \begin{cases} k^2x - x & \text{if} \quad x \geq 1 \\ 3x & \text{if} \quad x < 1 \end{cases}$ is continuous on $\mathbb{R}$ if

(a) $k = \pm 4$
(b) $k = \pm 2$
(c) $k = 4$
(d) $k = -4$

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



then $f(x)$ is

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

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

(a) $\dfrac{n\ \pi}{2} \quad , \quad n \in Z$
(b) $n\ \pi \quad , \quad n \in Z$
(c) $(2n+1)\pi \quad , \quad n \in Z$
(d) $(2n+1)\dfrac{\pi}{2} \quad , \quad n \in Z$

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

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