

Unit Two

Limits

Multiple Choice

Questions

1. The table of function values below is for

$$f(x) = x^2 + 1$$

x	1.1	1.05	1.01	1.001
f(x)	2.2	2.1	2.02	2.002

This table helps illustrate that

- (A) $\lim_{x \rightarrow 2} f(x) = 1$
- (B) $\lim_{x \rightarrow 1^+} f(x) = 2$
- (C) $\lim_{x \rightarrow 1.001} f(x) = 2.002$
- (D) $\lim_{x \rightarrow 2^+} f(x) = 1$
- (E) $\lim_{x \rightarrow 1^-} f(x) = 2$

[CA0201-1]

2. The table of function values below is for

$$f(x) = |x - 1|$$

x	0.9	0.95	0.99	0.999
f(x)	0.1	0.05	0.01	0.0001

This table helps illustrate that

- (A) $\lim_{x \rightarrow 9^-} f(x) = 0$
- (B) $\lim_{x \rightarrow 0^+} f(x) = 1$
- (C) $\lim_{x \rightarrow 1} f(x)$ does not exist
- (D) $\lim_{x \rightarrow 1^-} f(x) = 1$
- (E) $\lim_{x \rightarrow 1^-} f(x) = 0$

[CA0201-2]

3. The table of function values below is for

$$f(x) = x^2 + 1$$

x	0.9	0.95	0.99	0.999
f(x)	1.81	1.9	1.98	1.998

This table helps illustrate the function limit

- (A) $\lim_{x \rightarrow 0} f(x) = 1.81$
- (B) $\lim_{x \rightarrow 10^-} f(x) = 2$
- (C) $\lim_{x \rightarrow 1^+} f(x) = 1.998$
- (D) $\lim_{x \rightarrow 1^-} f(x) = 2$
- (E) none of these

[CA0201-3]

4. $\lim_{x \rightarrow 3} \frac{x^4 - 81}{x^2 - 9} =$

- (A) ∞
- (B) 15
- (C) 18
- (D) 0
- (E) $-\infty$

[CA0202-1]

$$5. \quad \lim_{x \rightarrow 2} \frac{x^2 + 2x - 8}{x^2 - 4} =$$

(A) 0

(B) ∞

(C) 2

(D) $-\frac{1}{2}$

(E) $\frac{3}{2}$

[CA0202-2]

$$6. \quad \lim_{x \rightarrow a} \frac{x^4 - a^4}{x^3 - a^3} =$$

(A) a

(B) ∞

(C) $\frac{4}{3a}$

(D) $\frac{4}{3}$

(E) $\frac{4a}{3}$

[CA0202-3]

7. The table below shows values for

$$\left(1 + \frac{1}{n}\right)^n$$

x	200	2000	20000	200000
$\left(1 + \frac{1}{n}\right)^n$	2.716	2.7169	2.71815	2.7183

This table helps establish the limit

- (A) $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n = \pi$
- (B) $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n = 3$
- (C) $\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n = e$
- (D) $\lim_{n \rightarrow 3} \left(1 + \frac{1}{n}\right)^n = 100000$
- (E) none of these

[CA0203-1]

8. $\lim_{n \rightarrow \infty} \left[\frac{n+1}{n}\right]^n =$

- (A) π
- (B) e
- (C) 1
- (D) ∞
- (E) 2

[CA0203-2]

9. $\lim_{n \rightarrow \infty} \left(1 + \frac{x}{n}\right)^n =$

- (A) x
- (B) 1
- (C) π
- (D) e^x
- (E) none of these

[CA0203-3]

10. $\lim_{n \rightarrow \infty} \frac{5n^2}{2n^2 + 500n}$ is

- (A) nonexistent
- (B) 5
- (C) 0
- (D) $\frac{5}{2}$
- (E) $\frac{1}{100}$

[CA0204-1]

11. $\lim_{n \rightarrow \infty} \frac{3^{-n}}{3^n}$ is

- (A) 1
- (B) 0
- (C) -1
- (D) ∞
- (E) $\frac{1}{3}$

[CA0204-2]

12. $\lim_{x \rightarrow \infty} 4 \cos \frac{1}{x}$ is

- (A) 0
- (B) 2
- (C) ∞
- (D) 4
- (E) 2π

[CA0204-3]

13. $\lim_{x \rightarrow 0} \frac{\sin 3x}{2x}$ is

- (A) undefined
- (B) $\frac{3}{2}$
- (C) $\frac{2}{3}$
- (D) 0
- (E) none of these

[CA020501-1]

14. $\lim_{x \rightarrow 0} \frac{\sin \frac{x}{2}}{\sin 5x}$ is

- (A) $\frac{1}{5}$
- (B) ∞
- (C) nonexistent
- (D) $\frac{1}{10}$
- (E) $\frac{5}{2}$

[CA020501-2]

15. $\lim_{x \rightarrow 0} \frac{\sin^2 x}{2x^2}$ is

- (A) nonexistent
- (B) $\frac{1}{2}$
- (C) $\frac{1}{4}$
- (D) 0
- (E) none of these

[CA020501-3]

16. $\lim_{x \rightarrow 0} \frac{\tan 2x}{x}$ is

- (A) $\frac{1}{2}$
- (B) 0
- (C) 2π
- (D) ∞
- (E) 2

[CA020502-1]

17. $\lim_{x \rightarrow 0} \frac{\tan^2 \frac{x}{2}}{x^2}$ is

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

[CA020502-2]

18. $\lim_{x \rightarrow 0} \frac{x}{\tan 4x}$ is

- (A) nonexistent
- (B) $\frac{1}{4}$
- (C) 4
- (D) 0
- (E) $\frac{\pi}{4}$

[CA020502-3]

19. $\lim_{x \rightarrow 0} \cos \frac{x}{2}$ is

(A) $\frac{1}{2}$

(B) 1

(C) 2

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

(E) -1

[CA020503-1]

20. $\lim_{x \rightarrow 0} \frac{\sin x \cos x}{x}$ is

(A) 1

(B) 2

(C) $\frac{1}{2}$

(D) ∞

(E) none of these

[CA020503-2]

21. $\lim_{x \rightarrow 0} \frac{x(1 + \cos x)}{2 \sin x}$ is

- (A) 0
- (B) 2
- (C) nonexistent
- (D) 1
- (E) none of these

[CA020503-3]

22. Let f be a function defined by

$$f(x) = \begin{cases} \frac{x^2 - 1}{x - 1}, & x < 1 \\ 3, & x = 1 \\ x + 3, & x > 1 \end{cases}$$

$\lim_{x \rightarrow 1} f(x)$ is

- (A) 2
- (B) 3
- (C) nonexistent
- (D) 0
- (E) none of these

[CA020602-1]

23. Let f be the function defined by

$$f(x) = \begin{cases} x^2, & x \leq 0 \\ x + 4, & x > 0 \end{cases}$$

$\lim_{x \rightarrow 0} f(x)$ is

- (A) 0
- (B) 4
- (C) 2
- (D) nonexistent
- (E) none of these

[CA020601-2]

24. Let $f(x)$ be defined by

$$f(x) = \begin{cases} \frac{4}{x-2}, & x \neq 2 \\ 2, & x = 2 \end{cases}$$

$\lim_{x \rightarrow 2} f(x)$ is

- (A) nonexistent
- (B) 2
- (C) -2
- (D) 0
- (E) 1

[CA020601-3]

25. Let f be the step function defined by

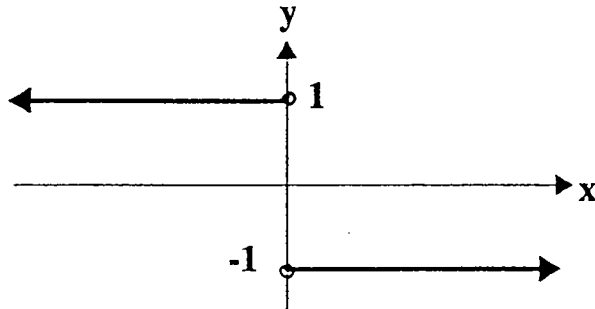
$$f(x) = \begin{cases} \frac{|x|}{x} & , x \neq 0 \\ 0 & , x = 0 \end{cases}$$

$\lim_{x \rightarrow 0} f(x)$ is

- (A) nonexistent
- (B) 0
- (C) 1
- (D) -1
- (E) 4

[CA020602-1]

26.



The graph above shows the step function $y = f(x)$

$\lim_{x \rightarrow 0} f(x)$ is

- (A) 0
- (B) 1
- (C) nonexistent
- (D) -1
- (E) none of these

[CA020602-2]

27. Let f be the step function defined by

$$f(x) = \begin{cases} \frac{|x-2|}{x-2}, & x \neq 2 \\ 0, & x = 2 \end{cases}$$

$\lim_{x \rightarrow 2} f(x)$ is

- (A) 0
- (B) 1
- (C) nonexistent
- (D) -1
- (E) none of these

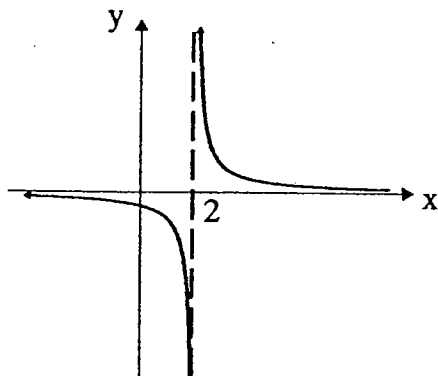
[CA020602-3]

28. $\lim_{x \rightarrow 0} \frac{8}{x^2}$ is

- (A) 8
- (B) 0
- (C) -1
- (D) nonexistent
- (E) none of these

[CA020603-1]

29.



The graph above shows $f(x) = \frac{1}{x-2}$

$\lim_{x \rightarrow 2} f(x)$ is nonexistent since

- (A) it equals 0
- (B) $\lim_{x \rightarrow 2^+} f(x) \neq \lim_{x \rightarrow 2^-} f(x)$
- (C) $\lim_{x \rightarrow 2^+} f(x) = \lim_{x \rightarrow 2^-} f(x)$
- (D) $y = 2$ is an asymptote to the curve
- (E) none of these

[CA020603-2]

30. $\lim_{x \rightarrow 3} \frac{x}{x-3}$ is

- (A) 1
- (B) $-\frac{1}{3}$
- (C) nonexistent
- (D) 0
- (E) finite

[CA020603-3]

31. $\lim_{x \rightarrow \infty} 3 \cos \frac{x}{4}$ is

- (A) 3
- (B) 0
- (C) ∞
- (D) $\frac{3}{4}$
- (E) none of these

[CA020604-1]

32. $\lim_{x \rightarrow \infty} 2 \sin \frac{x}{3}$ is

- (A) 2
- (B) $\frac{2}{3}$
- (C) 0
- (D) ∞
- (E) nonexistent

[CA020604-2]

33. $\lim_{x \rightarrow 0} 4 \cos \frac{1}{x}$ is

(A) nonexistent

(B) 1

(C) ∞

(D) 4

(E) 0

[CA020604-3]

34. Let
$$g(x) = \begin{cases} \frac{x^2 - 4}{x - 2}, & x \neq 2 \\ 3, & x = 2 \end{cases}$$

Which of the following statements I, II and III are TRUE?

(I) $\lim_{x \rightarrow 2} g(x)$ exists

(II) $g(2)$ exists

(III) g is continuous at $x = 2$

(A) only I

(B) only II

(C) I and II

(D) none of them

(E) all of them

[CA0207-1]

35. Which of the following functions is NOT continuous at $x = 2$?

(A) $f(x) = |x - 2|$

(B) $f(x) = x$

(C) $f(x) = \frac{1}{x}$

(D) $f(x) = \frac{4}{x - 2}$

(E) $f(x) = x^2 - 2$

[CA0207-2]

36. Let

$$h(x) = \begin{cases} \frac{x^2 - 25}{x - 5} & , x \neq 5, \\ 10 & , x = 5 \end{cases}$$

Which of the following statements I II and III are TRUE?

(I) $\lim_{x \rightarrow 5} h(x)$ exists

(II) $h(5)$ exists

(III) $h(x)$ is continuous at $x = 5$

(A) only I

(B) only II

(C) I and II

(D) none of them

(E) all of them

[CA0207-3]