

Topic :-LIMITS AND DERIVATIVES

- The value of $\lim_{x \rightarrow 0} \frac{e^x - (1+x)}{x^2}$, is
a) 0 b) 1/2 c) 2 d) e
- $\lim_{x \rightarrow \infty} \frac{(2x+1)^{40}(4x-1)^5}{(2x+3)^{45}}$ is equal to
a) 16 b) 24 c) 32 d) 8
- If $f:R \rightarrow R$ is defined by $f(x) = [x-3] + [x-4]$ for $x \in R$, then $\lim_{x \rightarrow 3^-} f(x)$ is equal to
a) -2 b) -1 c) 0 d) 1
- The value of $\lim_{x \rightarrow 2^-} \{x + (x - [x]^2)\}$, is
a) 0 b) 1 c) 2 d) 3
- The value of $\lim_{x \rightarrow \infty} \left(\frac{x^2 + 2x + 3}{2x^2 + x + 5} \right)^{\frac{3x-2}{3x+2}}$, is
a) $e^{1/2}$ b) $e^{3/2}$ c) e^3 d) None of these
- $\lim_{x \rightarrow 0} \left[\frac{e^x - e^{\sin x}}{x - \sin x} \right]$ is equal to
a) -1 b) 0 c) 1 d) None of these
- The value of $\lim_{x \rightarrow 1} (\log_2 2x)^{\log_x 5}$ is
a) 5/2 b) $e^{\log_2 5}$ c) $\log 5 / \log 2$ d) $e^{\log_5 2}$
- Let $f:R \rightarrow R$ be a positive increasing function with $\lim_{x \rightarrow \infty} \frac{f(3x)}{f(x)} = 1$. Then, $\lim_{x \rightarrow \infty} \frac{f(2x)}{f(x)}$ is equal to
a) 1 b) $\frac{2}{3}$ c) $\frac{3}{2}$ d) 3
- If $f(x) = \begin{cases} x^2 - 3, & 2 < x < 3 \\ 2x + 5, & 3 < x < 4 \end{cases}$, the equation whose roots are $\lim_{x \rightarrow 3^-} f(x)$ and $\lim_{x \rightarrow 3^+} f(x)$, is
a) $x^2 - 7x + 3 = 0$ b) $x^2 - 20x + 66 = 0$ c) $x^2 - 17x + 66 = 0$ d) $x^2 - 18x + 60 = 0$

10. If $f(x) = \begin{cases} x \sin\left(\frac{1}{x}\right), & x \neq 0 \\ 0, & x = 0 \end{cases}$ Then, $\lim_{x \rightarrow 0} f(x)$
- a) Is equal to 1 b) Is equal to -1 c) Is equal to 0 d) Does not exist
11. The value of $\lim_{x \rightarrow -\pi} \frac{|x + \pi|}{\sin x}$
- a) Is equal to -1 b) Is equal to 1 c) Is equal to π d) Does not exist
12. Let $f(x) = \frac{1}{\sqrt{18 - x^2}}$. The value of $\lim_{x \rightarrow 3} \frac{f(x) - f(3)}{x - 3}$, is
- a) 0 b) $-\frac{1}{9}$ c) $-\frac{1}{3}$ d) $\frac{1}{9}$
13. The value of $\lim_{x \rightarrow \infty} \frac{5^{x+1} - 7^{x+1}}{5^x - 7^x}$, is
- a) 5 b) -5 c) 7 d) -7
14. If $A_i = \frac{x - a_i}{|x - a_i|}$, $i = 1, 2, \dots, n$ and if $a_1 < a_2 < a_3 < \dots < a_n$. Then, $\lim_{x \rightarrow a_m} (A_1 A_2 \dots A_n)$, $1 \leq m \leq n$
- a) Is equal to $(-1)^m$ b) Is equal to $(-1)^{m+1}$ c) Is equal to $(-1)^{m-1}$ d) Does not exist
15. $\lim_{x \rightarrow -1} \frac{(1+x)(1-x^2)(1+x^3)(1-x^4)\dots(1-x^{4n})}{[(1+x)(1-x^2)(1+x^3)(1-x^4)\dots(1-x^{2n})]^2}$ is equal to
- a) ${}^{4n}C_{2n}$ b) ${}^{2n}C_n$ c) $2 \cdot {}^{4n}C_{2n}$ d) $2 \cdot {}^{4n}C_n$
16. The value of $\lim_{x \rightarrow \infty} \frac{\log x}{x^n}$, $n > 0$ is
- a) 0 b) 1 c) $\frac{1}{n}$ d) $\frac{1}{n!}$
17. If f be a function such that $f(9) = 9$ and $f'(9) = 3$, then $\lim_{x \rightarrow 9} \frac{\sqrt{f(x)} - 3}{\sqrt{x} - 3}$ is equal to
- a) 9 b) 3 c) 1 d) None of these
18. Let $f(x) = \lim_{x \rightarrow \infty} \frac{x^{2n} - 1}{x^{2n} + 1}$, then
- a) $f(x) = \begin{cases} 1, & |x| > 1 \\ -1, & |x| < 1 \end{cases}$
- b) $f(x) = \begin{cases} 1, & |x| < 1 \\ -1, & |x| > 1 \end{cases}$
- c) $f(x)$ is not defined for any value of x
- d) $f(x) = 1$ for $|x| = 1$
19. $\lim_{x \rightarrow 1} \frac{e^{-x} - e^{-1}}{x - 1}$ is equal to
- a) $\frac{1}{e}$ b) $-\frac{1}{e}$ c) 1 d) None of these
20. The value of $\lim_{n \rightarrow \infty} \frac{x^n}{x^n + 1}$, where $x < -1$ is

a) $\frac{1}{2}$

b) $-\frac{1}{2}$

c) 1

d) None of these

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