

Topic :-LIMITS AND DERIVATIVES

1. If $l_1 = \lim_{x \rightarrow -2} (x + |x|)$, $l_2 = \lim_{x \rightarrow -2} (2x + |x|)$ and $l_3 = \lim_{x \rightarrow \pi/2} \frac{\cos x}{x - \pi/2}$, then

a) $l_1 < l_2 < l_3$ b) $l_2 < l_3 < l_1$ c) $l_3 < l_2 < l_1$ d) $l_1 < l_3 < l_2$
2. $\lim_{x \rightarrow \infty} \left(\frac{x+2}{x+1}\right)^{x+3}$ is equal to

a) 1 b) e c) e^2 d) e^3
3. $\lim_{x \rightarrow 0} \frac{1}{x^{12}} \left\{ 1 - \cos \frac{x^2}{2} - \cos \frac{x^4}{4} + \cos \frac{x^2}{2} \cos \frac{x^4}{4} \right\}$ is equal to

a) $\frac{1}{32}$ b) $\frac{1}{256}$ c) $\frac{1}{16}$ d) $-\frac{1}{256}$
4. If $f(x) = \sqrt{\frac{x - \sin x}{x + \cos^2 x}}$, then $\lim_{x \rightarrow \infty} f(x)$ is

a) 0 b) ∞ c) 1 d) None of these
5. The value of $\lim_{x \rightarrow 1} (2 - x)^{\tan \frac{\pi x}{2}}$ is equal to

a) $e^{-2/\pi}$ b) $e^{1/\pi}$ c) $e^{2/\pi}$ d) $e^{-1/\pi}$
6. $\lim_{n \rightarrow \infty} r^n = 0$, then r is equal to

a) $\frac{4}{5}$ b) $\frac{5}{4}$ c) 2 d) 1
7. The value of $\lim_{x \rightarrow 0} \frac{5^x - 5^{-x}}{2x}$ is

a) $\log 5$ b) 0 c) 1 d) $2 \log 5$
8. $\lim_{x \rightarrow 0} \frac{\sqrt{1 - \cos 2x}}{\sqrt{2}x}$ is

a) λ b) -1 c) 0 d) Does not exist
9. The value of $\lim_{x \rightarrow \infty} a^x \sin \left(\frac{b}{a^x}\right)$ is ($a > 1$)

a) $b \log a$ b) $a \log b$ c) b d) None of these
10. $\lim_{x \rightarrow \infty} \left(\frac{x^3}{3x^2 - 4} - \frac{x^2}{3x + 2}\right)$ is equal to

- a) $-\frac{1}{4}$ b) $-\frac{1}{2}$ c) 0 d) $\frac{2}{9}$
11. $\lim_{x \rightarrow 0} \frac{e^{x^2} - \cos x}{x^2}$ is equal to
a) $3/2$ b) $1/2$ c) $2/3$ d) None of these
12. The value of $\lim_{x \rightarrow \infty} \left\{ \frac{a_1^{1/x} + a_2^{1/x} + \dots + a_n^{1/x}}{n} \right\}^1$, is
a) $a_1 + a_2 + \dots + a_n$ b) $e^{a_1 + a_2 + \dots + a_n}$ c) $\frac{a_1 + a_2 + \dots + a_n}{n}$ d) $a_1 a_2 \dots a_n$
13. The value of $\lim_{x \rightarrow 0} \frac{\sin^2 x + \cos x - 1}{x^2}$ is
a) 1 b) $\frac{1}{2}$ c) $-\frac{1}{2}$ d) 0
14. $\lim_{x \rightarrow 0} \frac{\sin 4x}{1 - \sqrt{1 - x}}$ is
a) 4 b) 8 c) 10 d) 2
15. $\lim_{x \rightarrow 1} \frac{x^8 - 2x + 1}{x^4 - 2x + 1}$ equals
a) 3 b) 0 c) -3 d) 1
16. The value of $\lim_{x \rightarrow \infty} \left(\sqrt{a^2 x^2 + ax + 1} - \sqrt{a^2 x^2 + 1} \right)$ is
a) $\frac{1}{2}$ b) 1 c) 2 d) None of these
17. $\lim_{x \rightarrow 0} (-1)^{[x]}$, where $[.]$ denotes the greatest integer function is equal to
a) 0 b) 1 c) -1 d) Does not exist
18. $\lim_{x \rightarrow 0} \frac{(1 - e^x) \sin x}{x^2 + x^3}$ is equal to
a) -1 b) 0 c) 1 d) 2
19. The value of $\lim_{x \rightarrow \infty} \left(\frac{x+3}{x+1} \right)^{x+2}$ is
a) 0 b) 1 c) e^2 d) e^4
20. If α is a repeated root of $ax^2 + bx + c = 0$, then $\lim_{x \rightarrow \alpha} \frac{\sin(ax^2 + bx + c)}{(x - \alpha)^2}$ is
a) 0 b) a c) b d) c