

Topic :- CONTINUITY AND DIFFERENTIABILITY

1. The set of points where the function $f(x) = \sqrt{1 - e^{-x^2}}$ is differentiable is
a) $(-\infty, \infty)$ b) $(-\infty, 0) \cup (0, \infty)$ c) $(-1, \infty)$ d) None of these

2. If $f(x) = x \sin\left(\frac{1}{x}\right)$, $x \neq 0$, then the value of function at $x = 0$, so that the function is continuous at $x = 0$ is
a) 1 b) -1 c) 0 d) Indeterminate

3. The value of $f(0)$ so that the function $f(x) = \frac{2 - (256 - 7x)^{1/8}}{(5x + 32)^{1/5} - 2}$ ($x \neq 0$) is continuous everywhere, is given by
a) -1 b) 1 c) 26 d) None of these

4. The derivative of $f(x) = |x|^3$ at $x = 0$ is
a) -1 b) 0 c) Does not exist d) None of these

5. If $f(x) = \begin{cases} \frac{(4^x - 1)^3}{\sin\left(\frac{x}{a}\right) \log\left(1 + \frac{x^2}{3}\right)}, & x \neq 0 \\ 9(\log 4)^3, & x = 0 \end{cases}$ is continuous function at $x = 0$, then the value of a is equal to
a) 3 b) 1 c) 2 d) 0

6. $f(x) = |[x] + x|$ in $-1 < x \leq 2$ is
a) Continuous at $x = 0$
b) Discontinuous at $x = 1$
c) Not differentiable at $x = 2, 0$
d) All the above

7. Let $f(x) = [x^3 - x]$, where $[x]$ the greatest integer function is. Then the number of points in the interval $(1, 2)$, where function is discontinuous is
a) 4 b) 5 c) 6 d) 7

16. If the derivative of the function $f(x)$ is everywhere continuous and is given by

$$f(x) = \begin{cases} bx^2 + ax + 4; & x \geq -1 \\ ax^2 + b; & x < -1 \end{cases}, \text{ then}$$

- a) $a = 2, b = -3$ b) $a = 3, b = 2$ c) $a = -2, b = -3$ d) $a = -3, b = -2$

17. If $f(x) = \begin{cases} \frac{x \log \cos x}{\log(1+x^2)}, & x \neq 0 \\ 0, & x = 0 \end{cases}$, then

- a) $f(x)$ is not continuous at $x = 0$
b) $f(x)$ is not continuous and differentiable at $x = 0$
c) $f(x)$ is not continuous at $x = 0$ but not differentiable at $x = 0$
d) None of these

18. If the function $f(x) = \begin{cases} Ax - B, & x \leq 1 \\ 3x, & 1 < x < 2 \\ Bx^2 - A, & x \geq 2 \end{cases}$ be continuous at $x = 1$ and discontinuous at $x = 2$, then

- a) $A = 3 + B, B \neq 3$ b) $A = 3 + B, B = 3$ c) $A = 3 + B$ d) None of these

19. If $f(x) = \begin{cases} |x - 4|, & \text{for } x \geq 1 \\ (x^3/2) - x^2 + 3x + (1/2), & \text{for } x < 1 \end{cases}$, then

- a) $f(x)$ is continuous at $x = 1$ and $x = 4$
b) $f(x)$ is differentiable at $x = 4$
c) $f(x)$ is continuous and differentiable at $x = 1$
d) $f(x)$ is not continuous at $x = 1$

20. The function $f(x) = a[x + 1] + b[x - 1]$, where $[x]$ is the greatest integer function, is continuous at $x = 1$, is

- a) $a + b = 0$ b) $a = b$ c) $2a - b = 0$ d) None of these