DPP

DAILY PRACTICE PROBLEMS

CLASS : XIIth **SUBJECT : MATHS**

DATE : **DPP NO. : 4**

Topic :- CONTINUITY AND DIFFERENTIABILITY

1. The set of points where the function $f(x) = x|x|$ is differentiable is

a) $(-\infty, \infty)$ b) $(-\infty, 0) \cup (0, \infty)$ c) $(0, \infty)$ d) $[0, \infty)$

2. If $f(x+y) = f(x)f(y)$ for all real x and y, $f(6) = 3$ and $f'(0) = 10$, then $f'(6)$ is

a) 30 b) 13 c) 10 d) 0

3. If $f(x) = |x-a|\phi(x)$, where $\phi(x)$ is continuous function, then

a) $f'(a^+) = \phi(a)$ b) $f'(a^-) = \phi(a)$ c) $f'(a^+) = f'(a^-)$ d) None of these

4. If $f(x) = \begin{cases} xe^{-\left(\frac{1}{|x|}+\frac{1}{x}\right)}, & x \neq 0 \\ 0, & x = 0 \end{cases}$, then $f(x)$ is

a) Continuous as well as differentiable for all x

b) Continuous for all x but not differentiable at $x = 0$

c) Neither differentiable nor continuous at $x = 0$

d) Discontinuous everywhere

5. If $f(x) = \begin{cases} 3, & x < 0 \\ 2x+1, & x \geq 0 \end{cases}$, then

a) Both $f(x)$ and $f(|x|)$ are differentiable at $x = 0$

b) $f(x)$ is differentiable but $f(|x|)$ is not differentiable at $x = 0$

c) $f(|x|)$ is differentiable but $f(x)$ is not differentiable at $x = 0$

d) Both $f(x)$ and $f(|x|)$ are not differentiable at $x = 0$

6. If $\lim\limits_{x \to c} \frac{f(x) - f(c)}{x - c}$ exists finitely, then

a) $\lim\limits_{x \to c} f(x) = f(c)$

b) $\lim\limits_{x \to c} f'(x) = f'(c)$

c) $\lim\limits_{x \to c} f(x)$ does not exist

d) $\lim\limits_{x \to c} f(x)$ may or may not exist

7. The number of points at which the function $f(x) = |x - 0.5| + |x - 1| + \tan x$ does not have a derivative in the interval $(0, 2)$, is

a) 1 b) 2 c) 3 d) 4

8. If $f(x) = \begin{cases} \log_{(1-3x)}(1+3x), & \text{for } x \neq 0 \\ k, & \text{for } x = 0 \end{cases}$ is continuous at $x = 0$, then k is equal to

a) -2 b) 2 c) 1 d) -1

9. Let $f(x)$ be a function differentiable at $x = c$. Then, $\lim_{x \to c} f(x)$ equals

a) $f'(c)$ b) $f''(c)$ c) $\frac{1}{f(c)}$ d) None of these

10. If $f(x) = ae^{|x|} + b|x|^2$; $a, b \in R$ and $f(x)$ is differentiable at $x = 0$. Then a and b are

a) $a = 0, b \in R$ b) $a = 1, b = 2$ c) $b = 0, a \in R$ d) $a = 4, b = 5$

11. Let $f(x) = (x + |x|)|x|$. The, for all x

a) f and f' are continuous

b) f is differentiable for some x

c) f' is not continuous

d) f'' is continuous

12. If $f(x) = \begin{cases} \frac{x-1}{2x^2 - 7x + 5}, & \text{for } x \neq 1 \\ -\frac{1}{3}, & \text{for } x = 1 \end{cases}$, then $f'(1)$ is equal to

a) $-\frac{1}{9}$ b) $-\frac{2}{9}$ c) $-\frac{1}{3}$ d) $\frac{1}{3}$

13. Suppose $f(x)$ is differentiable at $x = 1$ and $\lim_{h \to 0} \frac{1}{h} f(1+h) = 5$, then $f'(1)$ equals

a) 6 b) 5 c) 4 d) 3

14. If $f: R \to R$ is defined by

$f(x) = \begin{cases} \frac{x+2}{x^2 + 3x + 2}, & \text{if } x \in R - \{-1, -2\} \\ -1, & \text{if } x = -2 \\ 0, & \text{if } x = -1 \end{cases}$, then f is continuous on the set

a) R b) $R - \{-2\}$ c) $R - \{-1\}$ d) $R - (-1, -2)$

15. Let $f(x) = \frac{(e^x - 1)^2}{\sin\left(\frac{x}{a}\right) \log\left(1 + \frac{x}{4}\right)}$ for $x \neq 0$ and $f(0) = 12$. If f is continuous at $x = 0$, then the value of a is equal to

a) 1 b) -1 c) 2 d) 3

16. If a function $f(x)$ is given by $f(x) = \frac{x}{1+x} + \frac{x}{(x+1)(2x+1)} + \frac{x}{(2x+1)(3x+1)} + \ldots\infty$ then at $x = 0$, $f(x)$

a) Has no limit

b) Is not continuous

c) Is continuous but not differentiable

d) Is differentiable

17. If $f(x)$ is continuous function and $g(x)$ be discontinuous, then

a) $f(x) + g(x)$ must be continuous

b) $f(x) + g(x)$ must be discontinuous

c) $f(x) + g(x)$ for all x
d) None of these

18. A function $f: R \rightarrow R$ satisfies the equation $f(x+y) = f(x)f(y)$ for all $x, y \in R$ and $f(x) \neq 0$ for all $x \in R$. If $f(x)$ is differentiable at x = 0 and $f'(0) = 2$, then $f'(x)$ equals

a) $f(x)$ b) $-f(x)$ c) $2f(x)$ d) None of these

19. Consider $f(x) = \begin{cases} \frac{x^2}{|x|}, & x \neq 0 \\ 0, & x = 0 \end{cases}$

a) $f(x)$ is discontinuous everywhere
b) $f(x)$ is continuous everywhere
c) $f'(x)$ exists in $(-1, 1)$
d) $f'(x)$ exists in $(-2, 2)$

20. If $f(x)$ is continuous at $x = 0$ and $f(0) = 2$, then $\lim_{x \to 0} \frac{\int_0^x f(u)du}{x}$ is

a) 0   b) 2   c) $f(2)$ d) None of these

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