DPP

DAILY PRACTICE PROBLEMS

CLASS : XIIth | **SUBJECT : MATHS**

DATE : | **DPP NO. : 10**

Topic :- CONTINUITY AND DIFFERENTIABILITY

1. Which one of the following is not true always?
   a) If $f(x)$ is not continuous at $x = a$, then it is not differentiable at $x = a$
   b) If $f(x)$ is continuous at $x = a$, then it is differentiable at $x = a$
   c) If $f(x)$ and $g(x)$ are differentiable at $x = a$, then $f(x) + g(x)$ is also differentiable at $x = a$
   d) If a function $f(x)$ is continuous at $x = a$, then $\lim_{x \to a} f(x)$ exists

2. The value of the derivative of $|x - 1| + |x - 3|$ at $x = 2$ is
   a) 2 b) 1 c) 0 d) -2

3. On the interval $I = [-2, 2]$, the function $f(x) = \begin{cases} (x+1)\, e^{-\left(\frac{1}{|x|} + \frac{1}{x}\right)}, & x \neq 0 \\ 0, & x = 0 \end{cases}$
   a) Is continuous for all $x \in I - \{0\}$
   b) Assumes all intermediate values from $f(-2)$ to $f(2)$
   c) Has a maximum value equal to $3/e$
   d) All the above

4. Function $f(x) = \begin{cases} x - 1, & x < 2 \\ 2x - 3, & x \geq 2 \end{cases}$ is a continuous function
   a) For $x = 2$ only
   b) For all real values of x such that $x \neq 2$
   c) For all real values of x
   d) For all integer values of x only

5. The function $f(x) = \begin{cases} \frac{\tan x}{x}, & x \neq 0 \\ 1, & x = 0 \end{cases}$, is
   a) Continuous but not differentiable at $x = 0$
   b) Discontinuous at $x = 0$
   c) Continuous and differentiable at $x = 0$
   d) Not defined at $x = 0$

6. At the point $x = 1$, the function $f(x) = \begin{cases} x^3 - 1, & 1 < x < \infty \\ x - 1, & -\infty < x \leq 1 \end{cases}$
   a) Continuous and differentiable
   b) Continuous and not differentiable
   c) Discontinuous and differentiable
   d) Discontinuous and not differentiable

7. If $f(x)$ defined by $f(x)=\begin{cases}\frac{|x^2-x|}{x^2-x}, x\neq 0,1\\ 1,\ x=0\\ -1,\ \ x=1\end{cases}$ then $f(x)$ is continuous for all

a) x
b) x except at $x=0$
c) x except at $x=1$
d) x except at $x=0$ and $x=1$

8. The value of derivative of $|x-1|+|x-3|$ at $x=2$, is

a) -2 b) 0 c) 2 d) Not defined

9. If $f(x)=\begin{cases}1 & \text{for } x<0\\ 1+\sin x & \text{for } 0\leq x\leq \pi/2\end{cases}$, then at $x=0$, the derivative $f'(x)$ is

a) 1 b) 0 c) Infinite d) Does not exist

10. Let $g(x)=\frac{(x-1)^n}{\log\cos^m(x-1)}$; $0<x<2$, m and n are integers, $m\neq 0$, $n>0$, and let p be the left hand derivative of $|x-1|$ at $x=1$. If $\lim\limits_{x\to 1^+} g(x)=p$, then

a) $n=1, m=1$ b) $n=1, m=-1$ c) $n=2, m=2$ d) $n>2, m=n$

11. The function $f(x)=\frac{2x^2+7}{x^3+3x^2-x-3}$ is discontinuous for

a) $x=1$ only
b) $x=1$ and $x=-1$ only
c) $x=1, x=-1, x=-3$ only
d) $x=1, x=-1, x=-3$ and other values of x

12. If for a function $f(x)$, $f(2)=3$, $f'(2)=4$, then $\lim\limits_{x\to 2}[f(x)]$, where $[\cdot]$ denotes the greatest integer function, is

a) 2 b) 3 c) 4 d) Non-existent

13. A function $f(x)$ is defined as fallows for real x,

$f(x)=\begin{cases}1-x^2, & \text{for } x<1\\ 0, & \text{for } x=1\\ 1+x^2, & \text{for } x>1\end{cases}$ Then,

a) $f(x)$, is not continuous at $x=1$
b) $f(x)$ is continuous but not differentiable at $x=1$
c) $f(x)$ is both continuous and differentiable at $x=1$
d) None of the above

14. Let $f:R\to R$ be a function defined by $f(x)=\min\{x+1, |x|+1\}$. Then, which of the following is true?

a) $f(x)\geq 1$ for all $x\in R$
b) $f(x)$ is not differentiable at $x=1$
c) $f(x)$ is differentiable everywhere
d) $f(x)$ is not differentiable at $x=0$

15. If $f(x)=\begin{cases}mx+1, & x\leq \frac{\pi}{2}\\ \sin x+n, & x>\frac{\pi}{2}\end{cases}$ is continuous t $x=\frac{\pi}{2}$, then

a) $m = 1, n = 0$ b) $m = \frac{n\pi}{2} + 1$ c) $n = m\frac{\pi}{2}$ d) $m = n = \frac{\pi}{2}$

16. If $f(x) = \frac{\log_e(1 + x^2 \tan x)}{\sin x^3}, x \neq 0$, is to be continuous at $x = 0$, then $f(0)$ must be defined as

a) 1 b) 0 c) $\frac{1}{2}$ d) -1

17. Let $f(x) = \begin{cases} x^P \sin\frac{1}{x}, x \neq 0 \\ 0, \quad x = 0 \end{cases}$ then $f(x)$ is continuous but not differentiable at $x = 0$, if

a) $0 < p \leq 1$ b) $1 \leq p < \infty$ c) $-\infty < p < 0$ d) $p = 0$

18. The function f defined by

$f(x) = \begin{cases} \frac{\sin x^2}{x}, x \neq 0 \\ 0, \ x = 0 \end{cases}$ is

a) Continuous and derivable at $x = 0$
b) Neither continuous nor derivable at $x = 0$
c) Continuous but not derivable at $x = 0$
d) None of these

19. A function f on R into itself is continuous at a point a in R, iff for each $\in > 0$, there exists, $\delta > 0$ such that

a) $|f(x) - f(a)| < \in \Rightarrow |x - a| < \delta$ b) $|f(x) - f(a)| > \in \Rightarrow |x - a| > \delta$
c) $|x - a| > \delta |f(x) - f(a)| > \in$ d) $|x - a| < \delta |f(x) - f(a)| < \in$

20. The function $f(x) = x - |x - x^2|, -1 \leq x \leq 1$ is continuous on the interval

a) $[-1, 1]$ b) $(-1, 1)$ c) $[-1, 0) \cup (0, 1]$ d) $(-1, 0) \cup (0, 1)$