DPP
DAILY PRACTICE PROBLEMS

CLASS : XIIth | **SUBJECT : MATHS**
DATE : | **DPP NO. : 6**

Topic :- CONTINUITY AND DIFFERENTIABILITY

1. $f(x) = |x - 3|$ is ... at $x = 3$
   a) Continuous and not differentiable
   b) Continuous and differentiable
   c) Discontinuous and not differentiable
   d) Discontinuous and differentiable

2. At $x = \frac{3}{2}$ the function $f(x) = \frac{|2x-3|}{2x-3}$ is
   a) Continuous
   b) Discontinuous
   c) Differentiable
   d) Non-zero

3. The following functions are differentiable on $(-1, 2)$
   a) $\int_x^{2x} (\log t)^2 dt$
   b) $\int_x^{2x} \frac{\sin t}{t} dt$
   c) $\int_x^{2x} \frac{1-t+t^2}{1+t+t^2} dt$
   d) None of these

4. Let $f(x) = \frac{1-\tan x}{4x-\pi}, x \neq \frac{\pi}{4}, \ x \in \left[0, \frac{\pi}{2}\right]$. If $f(x)$ is continuous in $\left[0, \frac{\pi}{2}\right]$, then $f\left(\frac{\pi}{4}\right)$ is
   a) 1
   b) 1/2
   c) -1/2
   d) -1

5. If $f(x) = \begin{cases} \frac{1-\cos x}{x}, & x \neq 0 \\ k, & x = 0 \end{cases}$ is continuous at $x = 0$, then the value of k is
   a) 0
   b) $\frac{1}{2}$
   c) $\frac{1}{4}$
   d) $-\frac{1}{2}$

6. Let $f(x) = |x| + |x-1|$, then
   a) $f(x)$ is continuous at $x = 0$, as well as at $x = 1$
   b) $f(x)$ is continuous at $x = 0$, but not at $x = 1$
   c) $f(x)$ is continuous at $x = 1$, but not at $x = 0$
   d) None of these

7. The function $f(x)$ is defined as $f(x) = \frac{2x - \sin^{-1} x}{2x + \tan^{-1} x}$, if $x \neq 0$. The value of f to be assigned at $x = 0$ so that the function is continuous there, is
   a) $-\frac{1}{3}$
   b) 1
   c) $\frac{2}{3}$
   d) $\frac{1}{3}$

8. Let $f(x)$ be an odd function. Then $f'(x)$
   a) Is an even function
   b) Is an odd function
   c) May be even or odd
   d) None of these

9. 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) -13 d) $1/3$

10. If $f:R\to R$ given by

$f(x)=\begin{cases}2\cos x, \text{ if } x\leq -\frac{\pi}{2}\\ a+\sin x+b, \text{ if } -\frac{\pi}{2}<x<\frac{\pi}{2}\\ 1+\cos^2 x, \text{ if } x\geq\frac{\pi}{2}\end{cases}$ is a continuous

Function on R, then (a, b) is equal to

a) (1/2, 1/2) b) (0, -1) c) (0, 2) d) (1, 0)

11. If $f(x+y)=f(x)f(y)$ for all $x, y\in R$, $f(5)=2$, $f'(0)=3$. Then $f'(5)$ equals

a) 6 b) 3 c) 5 d) None of these

12. Let $f(x)$ be a function satisfying $f(x+y)=f(x)+f(y)$ and $f(x)=x\,g(x)$ for all $x, y\in R$, where $g(x)$ is continuous. Then,

a) $f'(x)=g'(x)$ b) $f'(x)=g(x)$ c) $f'(x)=g(0)$ d) None of these

13. If $f(x)=\sqrt{x+2\sqrt{2x-4}}+\sqrt{x-2\sqrt{2\,x-4}}$, then $f(x)$ is differentiable on

a) $(-\infty,\infty)$ b) $[2,\infty)-\{4\}$ c) $[2,\infty)$ d) None of these

14. If $f(x)=\begin{cases}x^2\sin\left(\frac{1}{x}\right), & x\neq 0\\ 0, & x=0\end{cases}$, then

a) f and f' are continuous at $x=0$

b) f is derivable at $x=0$ and f' is continuous at $x=0$

c) f is derivable at $x=0$ and f' is not continuous at $x=0$

d) f' is derivable at $x=0$

15. If a function $f(x)$ is defined as $f(x)=\begin{cases}\frac{x}{\sqrt{x^2}}, & x\neq 0\\ 0, & x=0\end{cases}$ then

a) $f(x)$ is continuous at $x=0$ but not differentiable at $x=0$

b) $f(x)$ is continuous as well as differentiable at $x=0$

c) $f(x)$ is discontinuous at $x=0$

d) None of these

16. If $f(x)=[\sqrt{2}\sin x]$, where $[x]$ represents the greatest integer function, then

a) $f(x)$ is periodic

b) Maximum value of $f(x)$ is 1 in the interval $[-2\pi, 2\pi]$

c) $f(x)$ is discontinuous at $x=\frac{n\pi}{2}+\frac{\pi}{4}, n\in Z$

d) $f(x)$ is differentiable at $x=n\pi, n\in Z$

17. $\lim_{x \to 0}[(1+3x)^{1/x}] = k$, then for continuity at $x = 0$, k is

a) 3 b) -3 c) e^3 d) e^{-3}

18. Let $f(x) = \begin{cases} \int_0^x \{5 + |1-t|\}dt, \text{ if } x > 2 \\ 5x + 1, \text{ if } x \le 2 \end{cases}$

a) $f(x)$ is continuous at $x = 2$

b) $f(x)$ is continuous but not differentiable at $x = 2$

c) $f(x)$ is everywhere differentiable

d) The right derivative of $f(x)$ at $x = 2$ does not exist

19. Let $f(x) = \begin{cases} \frac{1}{|x|} \text{ for } |x| \ge 1 \\ ax^2 + b \text{ for } |x| < 1 \end{cases}$

If $f(x)$ is continuous and differentiable at any point, then

a) $a = \frac{1}{2}, b = -\frac{3}{2}$ b) $a = -\frac{1}{2}, b = \frac{3}{2}$ c) $a = 1, b = -1$ d) None of these

20. If function $f(x) = \begin{cases} x, \text{ if } x \text{ is rational} \\ 1 - x, \text{ if } x \text{ is irrational} \end{cases}$, then the number of points at which $f(x)$ is continuous, is

a) ∞ b) 1 c) 0 d) None of these