DPP

DAILY PRACTICE PROBLEMS

CLASS : XIIth | SUBJECT : MATHS
DATE : | DPP NO. : 5

Topic :- CONTINUITY AND DIFFERENTIABILITY

1. Let $f(x+y)=f(x)f(y)$ for all $x, y \in R$. Suppose that $f(3)=3$ and $f'(0)=11$ then, $f'(3)$ is equal to

a) 22 b) 44 c) 28 d) None of these

2. If $f(x)=\begin{cases} x-5, & \text{for } x \leq 1 \\ 4x^2-9, & \text{for } 1<x<2 \\ 3x+4, & \text{for } x \geq 2 \end{cases}$, then $f'(2^+)$ is equal to

a) 0 b) 2 c) 3 d) 4

3. $f(x)=\sin|x|$. Then $f(x)$ is not differentiable at

a) $x=0$ only b) All x c) Multiples of π d) Multiples of $\frac{\pi}{2}$

4. If $f(x)=\sum_{n=0}^{\infty}\frac{x^n}{n!}(\log_e a)^n$, $a>0$, $a\neq 0$, then at $x=0$, $f(x)$ is

a) Everywhere continuous but not differentiable
b) Everywhere differentiable
c) Nowhere continuous
d) None of these

5. The function $f(x)=[x]\cos\left[\frac{2x-1}{2}\right]\pi$ where [.] denotes the greatest integer function, is discontinuous at

a) All x b) No x
c) All integer points d) x which is not an integer

6. The function $f(x)=\begin{cases} 1, & |x|\geq 1 \\ \frac{1}{n^2}, & \frac{1}{n}<|x|<\frac{1}{n-1}, n=2,3,\ldots \\ 0, & x=0 \end{cases}$

a) Is discontinuous at finitely many points
b) Is continuous everywhere
c) Is discontinuous only at $x=\pm\frac{1}{n}, n\in Z-\{0\}$ and $x=0$
d) None of these

7. Let f is a real-valued differentiable function satisfying $|f(x)-f(y)|\leq(x-y)^2$, $x, y \in R$ and $f(0)=0$, then $f(1)$ equals

a) 1 b) 2 c) 0 d) -1

8. Let $f(x) = [2x^3 - 5]$, [] denotes the greatest integer function. Then number of points (1, 2) where the function is discontinuous, is

a) 0 b) 13 c) 10 d) 3

9. ln[1, 3] the function $[x^2 + 1]$, $[x]$ denoting the greatest integer function, is continuous

a) For all x
b) For all x except at four points
c) For all except at seven points
d) For all except at eight-points

10. If $f(x) = |\log_{10} x|$, then at $x = 1$

a) $f(x)$ is continuous and $f'(1^+) = \log_{10} e$, $f'(1^-) = -\log_{10} e$
b) $f(x)$ is continuous and $f'(1^+) = \log_{10} e$, $f'(1^-) = \log_{10} e$
c) $f(x)$ is continuous and $f'(1^-) = \log_{10} e$, $f'(1^+) = -\log_{10} e$
d) None of these

11. The function $f(x) = |\cos x|$ is

a) Everywhere continuous and differentiable
b) Everywhere continuous and but not differentiable at $(2n + 1)\,\pi/2, n \in Z$
c) Neither continuous nor differentiable at $(2n + 1)\,\pi/2, n \in Z$
d) None of these

12. Let $f(x) = \begin{cases} \frac{x-4}{|x-4|} + a, & x < 4 \\ a + b, & x = 4 \\ \frac{x-4}{|x-4|} + b, & x > 4 \end{cases}$

Then, $f(x)$ is continuous at $x = 4$ when

a) $a = 0, b = 0$ b) $a = 1, b = 1$ c) $a = -1, b = 1$ d) $a = 1, b = -1$

13. If $f(x) = \begin{cases} \frac{2^x - 1}{\sqrt{1+x} - 1}, & -1 \le x < \infty,\ x \ne 0 \\ k, & x = 0 \end{cases}$ is continuous everywhere, then k is equal to

a) $\frac{1}{2}\log_e 2$ b) $\log_e 4$ c) $\log_e 8$ d) $\log_e 2$

14. The function $f(x) = \begin{cases} x^n \sin\left(\frac{1}{x}\right), & x \ne 0 \\ 0, & x = 0 \end{cases}$ is continuous and differentiable at $x = 0$, if

a) $n \in (0, 1]$ b) $n \in [1, \infty)$ c) $n \in (1, \infty)$ d) $n \in (-\infty, 0)$

15. The function $f(x) = \begin{cases} \frac{e^{1/x} - 1}{e^{1/x} + 1}, & x \ne 0 \\ 0, & x = 0 \end{cases}$

a) Is continuous at $x = 0$
b) Is not continuous at $x = 0$
c) Is not continuous at $x = 0$, but can be made continuous $x = 0$
d) None of these

16. A function $f(x) = \begin{cases} 1+x, & x \leq 2 \\ 5-x, & x > 2 \end{cases}$ is

a) Not continuous at $x = 2$
b) Differenti8able at $x = 2$
c) Continuous but not differentiable at $= 2$
d) None of the above

17. Let $f(x+y) = f(x)f(y)$ for all $x, y \in R$. If $f'(1) = 2$ and $f(4) = 4$, then $f'(4)$ equal to

a) 4
b) 1
c) 1/2
d) 8

18. Let $f(x) = [x]$ and $g(x) = \begin{cases} 0, & x \in Z \\ x^2, & x \in R - Z \end{cases}$ Then, which one of the following is incorrect?

a) $\lim_{x \to 1} g(x)$ exists, but $g(x)$ is not continuous at $x = 1$
b) $\lim_{x \to 1} f(x)$ does not exist and $f(x)$ is not continuous at $x = 1$
c) gof is continuous for all x
d) fog is continuous for all x

19. If $f(x) = \begin{cases} x, & \text{for} \quad 0 < x < 1 \\ 2-x, & \text{for} \quad 1 \leq x < 2 \\ x - (1/2)x^2, & \text{for} \quad x = 2 \end{cases}$.Then, $f'(1)$ is equal to

a) -1
b) 1
c) 0
d) None of these

20. The function $f(x) = |x| + \frac{|x|}{x}$ is

a) Discontinuous at origin because $|x|$ is discontinuous there
b) Continuous at origin
c) Discontinuous at origin because both $|x|$ and $\frac{|x|}{x}$ are discontinuous there
d) Discontinuous at the origin because $\frac{|x|}{x}$ is discontinuous there