DPP-02

1. If $f(x)=\begin{cases} x+\lambda & ,x<3 \\ 4, & ,x=3 \\ 3x-5 & ,x>3 \end{cases}$ is continuous at $x=3$, then the value of λ is

(A) 4 (B) 3 (C) 2 (D) 1

2. If $f(x)=\begin{cases} kx+1, & \text{if} \quad x\le\pi \\ \cos x, & \text{if} \quad x>\pi \end{cases}$ is continuous at $x=\pi$, then k is equal to

(A) $2/\pi$ (B) $-2/\pi$ (C) $1/\pi$ (D) $-1/\pi$

3. If $f(x)=\begin{cases} ax+1, & \text{if } x\le 3 \\ bx+3, & \text{if} \quad x>3 \end{cases}$ is continuous at $x=3$, then $a-b$ is equal to

(A) 1/3 (B) 1/2 (C) 2/3 (D) 3/2

4. Function $f(x)=\begin{cases} -1, & \text{when } x<-1 \\ -x, & \text{when } -1\le x\le 1 \\ 1, & \text{when } x>1 \end{cases}$ is continuous

(A) only at $x=1$ (B) only at $x=-1$

(C) at both $x=1$ and $x=-1$ (D) neither at $x=1$ nor at $x=-1$

5. If $f(x)=\begin{cases} -x^2 & ,\ x\le 0 \\ 5x-4 & ,\ 0<x\le 1 \\ 4x^2-3x & ,\ 1<x<2 \\ 3x+4 & ,\ x\ge 2 \end{cases}$, then f(x) is

(A) continuous at $x=0$ but not at $x=1$

(B) continuous at $x=2$ but not at $x=0$

(C) continuous at $x=0,1,2$

(D) discontinuous at $x=0,1,2$

6. If $f(x)=\begin{cases} x+2, & \text{when} \quad x<1 \\ 4x-1, & \text{when} \quad 1\le x\le 3 \\ x^2+5, & \text{when} \quad x>3 \end{cases}$, then correct statement is

(A) $\lim_{x\to 1} f(x)=\lim_{x\to 3} f(x)$

(B) f(x) is continuous at $x=3$

(C) f(x) is continuous at $x=1$

(D) f(x) is continuous at $x=1$ and 3

7. Function $f(x)=[x]$ is discontinuous at

(A) every real number (B) every rational number

(C) every integer (D) no where

8. In the following, discontinuous function is

(A) $|x|$ (B) $x + |x|$ (C) $x|x|$ (D) $|x|/x$

9. If $f(x) = \frac{\tan(\pi/4 - x)}{\cot 2x}\left(x \neq \frac{\pi}{4}\right)$ is everywhere continuous then $f(\pi/4)$ is equal to

(A) 1 (B) -1 (C) 1/2 (D) 2

10. If $f(x) = [x/2]$ is discontinuous at $x = a$, then

(A) $a \in N$ (B) $a \in W$ (C) $(a/2) \in Z$ (D) $a \in Q$

11. Which of the following functions has finite number of points of discontinuity

(A) $x + [x]$ (B) $\tan x$ (C) $|x|/x$ (D) $\sin[\pi x]$

12. If $f(x) = \begin{cases} \frac{\sin(a+1)x + \sin x}{x} & , x < 0 \\ 1/2 & , x = 0 \\ \frac{x^{3/2}+1}{2} & , x > 0 \end{cases}$

is continuous at $x = 0$, then the value of a is

(A) $1/2$ (B) $-1/2$ (C) $3/2$ (D) $-3/2$

13. If $f(x) = \begin{cases} x^a \sin 1/x & , x \neq 0 \\ 0, & x = 0 \end{cases}$ is continuous at $x = 0$, then

(A) $a < 0$ (B) $a > 0$ (C) $a = 0$ (D) $a \geq 0$

14. If $f(x) = \begin{cases} x\cos 1/x, & x \neq 0 \\ k & , x = 0 \end{cases}$ is continuous at $x = 0$, then

(A) $k > 0$ (B) $k < 0$ (C) $k = 0$ (D) $k \geq 0$

15. Function $f(x) = |\sin x| + |\cos x| + |x|$ is discontinuous at

(A) $x = 0$ (B) $x = \pi/2$ (C) $x = \pi$ (D) no where

16. If $f(x) = \begin{cases} 1, & x \leq 2 \\ ax + b & , 2 < x < 4 \\ 7 & , x \geq 4 \end{cases}$ is continuous at $x = 2$ and $x = 4$, then

(A) $a = 3, b = 5$ (B) $a = 3, b = -5$

(C) $a = 0, b = 3$ (D) $a = 0, b = 5$

17. If $f(x) = \frac{\sqrt{a^2 - ax + x^2} - \sqrt{a^2 + ax + x^2}}{\sqrt{a+x} - \sqrt{a-x}}$ is continuous for all values of x, then $f(0)$ is equal to

(A) $a\sqrt{a}$ (B) $\sqrt{a}$ (C) $-\sqrt{a}$ (D) $-a\sqrt{a}$

18. $f(x) = \begin{cases} \frac{x-4}{|x-4|} + a & , \quad x < 4 \\ a + b & , \quad x = 4 \\ \frac{x-4}{|x-4|} + b & , \quad x > 4 \end{cases}$ is continuous at $x = 4$, if

(A) $a = 0, b = 0$ (B) $a = 1, b = 1$

(C) $a = 1, b = -1$ (D) $a = -1, b = 1$

19. If $f(x) = \lim_{n\to\infty} (\sin\ x)^{2n}$, then $f(x)$ is

(A) continuous at $x = \pi$

(B) discontinuous at $x = \pi/2$

(C) discontinuous at $x = -\pi/2$

(D) discontinuous at an infinite number of points.