DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth **SUBJECT : MATHS**
DATE : **DPP NO. :3**

Topic :-LIMITS AND DERIVATIVES

1. If $f'(2) = 2, f''(2) = 1,$ then $\lim_{x\to 2} \frac{2x^2-4f'(x)}{x-2}$, is
   a) 4 b) 0 c) 2 d) ∞

2. $\lim_{x\to\pi/4} \frac{\int_2^{\sec^2 x} f(t)dt}{x^2-\pi^2/16}$ equals
   a) $\frac{8}{\pi}f(2)$ b) $\frac{2}{\pi}f(2)$ c) $\frac{2}{\pi}f\left(\frac{1}{2}\right)$ d) $4f(2)$

3. If $f(a) = 2,\ f'(a) = 1, g(a) = 3, g'(a) = -1,$ then $\lim_{x\to a} \frac{f(a)g(x)-f(x)g(a)}{x-a}$ is equal to
   a) 6 b) 1 c) -1 d) -5

4. If $f(x) = \left(\frac{x^2+5x+3}{x^2+x+2}\right)^x$ then $\lim_{x\to\infty} f(x)$ is equal to
   a) e^4 b) e^3 c) e^2 d) 24

5. $\lim_{x\to 0} \frac{\sin^{-1} x-x}{x^3\cos x}$ is equal to
   a) 1/2 b) 1/3 c) 1/6 d) 1/12

6. For $x > 0$, $\lim_{x\to 0}\left((\sin x)^{1/x} + \left(\frac{1}{x}\right)^{\sin x}\right)$ is
   a) 0 b) -1 c) 1 d) 2

7. The value of $\lim_{x\to\infty}\left(\frac{3x-4}{3x+2}\right)^{\frac{x+1}{3}}$ is equal to
   a) $e^{-1/3}$ b) $e^{-2/3}$ c) e^{-1} d) e^{-2}

8. $\lim_{x\to 0} \frac{1}{x}\sin^{-1}\left(\frac{2x}{1+x^2}\right)$ is equal to
   a) -2 b) 0 c) 2 d) ∞

9. $\lim_{x\to 0} \frac{2\sin^2 3x}{x^2}$ is equal to
   a) 0 b) 1 c) 18 d) 36

10. $\lim_{x\to 0} \frac{a^x+a^{-x}-2}{x^2}$ is equal to
    a) $(\log a)^2$ b) $\log a$ c) 0 d) None of these

11. Let $f(x) = \begin{cases} 1, \text{when } x \text{ is rational} \\ 0, \text{when } x \text{ irrational} \end{cases}$, then $\lim_{x\to 0} f(x)$ is
    a) 0 b) 1 c) $\frac{1}{2}$ d) None of these

12. For $x \in R$ $\lim_{x\to\infty}\left(\frac{x-3}{x+2}\right)^x$ is equal to

a) e b) e^{-1} c) e^{-5} d) e^5

13. The value of $\lim_{x\to\infty} x\cos\left(\frac{\pi}{4x}\right)\sin\left(\frac{\pi}{4x}\right)$, is

a) $\frac{\pi}{2}$ b) $\frac{\pi}{4}$ c) 1 d) None of these

14. The derivative of function $f(x)$ is$\tan^4 x$. If $f(x) = 0$, then $\lim_{x\to 0}\frac{f(x)}{x}$is equal to

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

15. Let $f(x) = \begin{cases}(1/2)\{g(x)+(x)\}\sin(x), x \geq 1\\ \sin x/x\,, \quad x < 1\end{cases}$

Where $g(x) = \begin{cases}1, & \text{if } x > 0\\ -1, & \text{if } x < 0\\ 0, & \text{if } x = 0\end{cases}$Then, $\lim_{x\to 1} f(x)$ is equal to

a) 0 b) 2 c) sin 1 d) None of these

16. If $\lim_{x\to\infty}\left[\frac{x^3+1}{x^2+1} - (ax+b)\right] = 2$, then

a) $a = 1$and$b = 1$ b) $a = 1$ and $b = -1$ c) $a = 1$ and $b = -2$ d) $a = 1$ and $b = 2$

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

$f(x) = \begin{cases}\frac{x-2}{x^2-3x+2}, \text{if } x \in R - \{1,2\}\\ 2, \quad \text{if} \quad x = 1\\ 1, \quad \text{if} \quad x = 2\end{cases}$

Then $\lim_{x\to 2}\frac{f(x)-f(2)}{x-2}$ is equal to

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

18. Let $f: R \to R$ be a differentiable function such that $f(3) = 3, f'(3) = \frac{1}{2}$, Then, the value of $\lim_{x\to 3}\frac{\int_3^{f(x)} 2t^3 dt}{x-3}$ is

a) 25 b) 26 c) 27 d) None of these

19. Let $f(a) = g(a) = k$ and their nth derivatives $f^n(a), g^n(a)$ exist and are not equal for some$n$. Further if

$\lim_{x\to a}\frac{f(a)g(x)-f(a)-g(a)f(x)+g(a)}{g(x)-f(x)} = 4$, then the value of k is equal to

a) 4 b) 2 c) 1 d) 0

20. The value of $\lim_{x\to 0}\frac{\sin x}{\sqrt{x^2}}$, is

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