

SELF ASSESSMENT TEST -1**CLASS 10+2****DERIVATIVE**

1. Prove that $f(x) = |x|$ is cont. but not diff. at $x=0$.

2. Prove that $f(x) = [x]$ is not diff. at $x=1$.

3. For what choices of a and b is the function $f(x) = \begin{cases} x^2, & x \leq c \\ ax+b, & x > c \end{cases}$

Diff. at $x=c$?

4. Use chain rule find derivatives of following functions:

(a) $\left(\frac{3x-1}{2x+1}\right)^2$ (b) $\log(\log x)$ (c) $\log_7(\log x)$ (d) $\sec(\tan \sqrt{x})$

5. Diff. $|2x^2-1|$ w.r.t.x

6. Find $\frac{dy}{dx}$ in following cases:

(a) $x^2 + xy + y^2 = 12$ (b) $\sin(xy) + \cos(xy) = 1$

(c) $xy + x e^{-y} + y e^x = x^2$ (d) $e^x + e^y = e^{x+y}$

7. If $y = x \sin(a+y)$, prove that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin(a+y) - y \cos(a+y)}$

8. If $\sin y = x \sin(a+y)$ prove that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin(a)}$

9. If $\cos y = x \cos(a+y)$ prove that $\frac{dy}{dx} = \frac{\cos^2(a+y)}{\sin(a)}$

10. If $x\sqrt{1+y} + y\sqrt{1+x} = 0$ prove that $\frac{dy}{dx} = -\frac{1}{(1+x)^2}$

11. Diff. (a) $\sin^{-1}(\cos x)$ (b) $\sin^{-1}(e^{4x})$ (c) $\tan^{-1}(\log x)$ w.r.t.x

12. Diff. (a) $\frac{\sin^{-1}x}{\sqrt{1-x^2}}$ (b) $\sin^{-1}\left(\frac{1+2\sin x}{2+\cos x}\right)$ (c) $x\sec^{-1}x$ w.r.t. x

13. Diff. $\tan^{-1}\left(\frac{\cos x}{1+\sin x}\right)$ w.r.t.x

14. Diff. $\tan^{-1}\left(\frac{\sqrt{1+x^2}+1}{x}\right)$ w.r.t.x

15. Diff. $\tan^{-1}\left(\frac{x}{1+\sqrt{1-x^2}}\right)$ w.r.t.x

16. Diff. $\tan^{-1}\left(\frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}\right)$ w.r.t. x

17. If $y = \tan^{-1}\left(\frac{5ax}{a^2-6x^2}\right)$ prove that $\frac{dy}{dx} = \frac{3a}{a^2+9x^2} + \frac{2a}{a^2+4x^2}$

18. Diff. $\sec^{-1}\left(\frac{4x-5}{4x+5}\right) + \sin^{-1}\left(\frac{4x+5}{4x-5}\right)$ w.r.t.x

19. If $y = \sec^{-1}\left(\frac{1+x^2}{1-x^2}\right) + \sin^{-1}\left(\frac{2x}{1+x^2}\right)$ prove $\frac{dy}{dx} = \frac{4}{1+x^2}$

20. Diff. $\sin^{-1}\left(x\sqrt{1-x}-\sqrt{x}\sqrt{1-x^2}\right)$ w.r.t.x

21. Diff. $\tan(\sin^{-1} x)$ w.r.t x

22. Diff. $\frac{\tan^{-1} x}{1+x^2}$ w.r.t. x

23. Diff. $\sec^{-1}\left(\frac{1}{2x^2-1}\right)$ w.r.t.x

24. Diff. $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$ w.r.t.x

25. Diff. $\cos^{-1}\left(\sqrt{\frac{1+x}{2}}\right)$ w.r.t.x

26. If $y = \tan^{-1} \frac{4x}{1+5x^2} + \tan^{-1} \frac{2+3x}{3-2x}$ find $\frac{dy}{dx}$

27. Diff. $\tan^{-1} \frac{4-5x}{4+5x} + \tan^{-1} \frac{4+5x}{4-5x}$ w.r.t.x

28. If $y = \sin^{-1} \frac{x}{\sqrt{1+x^2}} + \cos^{-1} \frac{1}{\sqrt{1+x^2}}$ prove $\frac{dy}{dx} = \frac{2}{1+x^2}$

29. Diff. $\sin^{-1}\left(x^2\sqrt{1-x^2} + x\sqrt{1-x^4}\right)$ w.r.t.x

30. Diff. $\tan^{-1}\left(\frac{\sqrt{1+\sin x} + \sqrt{1-\sin x}}{\sqrt{1+\sin x} - \sqrt{1-\sin x}}\right)$ w.r.t.x

31. Diff. $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ w.r.t.x

32. Diff. $\tan^{-1}\left(\sqrt{\frac{1-\sin x}{1+\sin x}}\right)$ w.r.t.x

33. Diff. $\cos^{-1}(4x^3 - 3x)$ w.r.t. x

