

CLASS – XII SUBJECT – MATHEMATICS ASSIGNMENT NO. 3 TOPIC – CONTINUITY & DIFFERENTIATE

- Find the point of discontinuity for the function $f(x) = \begin{cases} x^4 - 16 & x \neq 2 \\ x - 2 & x = 2 \end{cases}$
- Show that $f(x) = \begin{cases} 5x - 4 & a < x < 1 \\ 4x^3 - 3x & 1 < x < 2 \end{cases}$ is continuous at $x = 1$
- For what value of K in the for continuous $x = 0$, $f(x) = \frac{1 - \cos 4x}{8x^2}$ $x \neq 0$
- If $f(x) = \begin{cases} 3ax + b & \text{if } x > 1 \\ 11 & \text{if } x = 1 \end{cases}$ $5ax - 2b$ if $x < 1$ is continuous at $x = 1$. find a, b
- If $f(x)$ is differentiable at $x = a$ find $\lim_{x \rightarrow a} \frac{x^2 f(a) - a^2 f(x)}{x - a}$
- Find values of a, b that $f(x)$ given by $f(x) = \begin{cases} 1 & : f(x) \leq 3 \\ ax + b & 3 < x < 5 \\ 7 & \text{if } x \leq 5 \end{cases}$
- If $y = -\cot^2 \frac{x}{2} - x$ by $\sin \frac{x}{2}$, prove : $\frac{dy}{dx} = \cot 3 \frac{x}{2}$
- If $x = \cos \theta$ and $y = \sin \theta - \theta \cos \theta$, prove $\frac{d^2 y}{dx^2} = \frac{\sec^2 \theta}{\theta}$
- If $y = \frac{2 - 3 \cos x}{\sin x}$, find $\frac{dy}{dx}$ at $x = \frac{\pi}{6}$
- If $y = 10g(1 + \cos x)$, Prove $\frac{d^3 y}{dx^3} + \frac{d^2 y}{dx^2} \cdot \frac{dy}{dx} = 0$
- If $y = \tan^{-1} \frac{\sqrt{a^2 + x^2} + \sqrt{a^2 - x^2}}{\sqrt{a^2 + x^2} - \sqrt{a^2 - x^2}}$ show that $\frac{dy}{dx} = \frac{-2a^2}{x^3} \left[1 + \frac{a^2}{\sqrt{a^4 - x^4}} \right]$
- If $Y = \sqrt{\frac{1 + e^x}{1 - e^x}}$, then show that $\frac{dy}{dx} = \frac{e^x}{(1 - e^x)\sqrt{1 - e^{2x}}}$
- If $y = \sin^{-1} [x\sqrt{1-x} - \sqrt{x}\sqrt{1-x^2}]$ find $\frac{dy}{dx}$
- If $y = \sin^{-1} \left(\frac{x^2 - y^2}{x^2 + y^2} \right) = \tan^{-1} a$, prove : $\frac{dy}{dx} = \frac{y}{x}$
- If $e^y = y^x$, prove $\frac{dy}{dx} = \frac{(\log y)^2}{\log y - 1}$
- If $x = a(\cos t + \log \tan t/2)$, $y = \sin t$ then find $\frac{dy}{dx}$ at $t = \frac{\pi}{4}$
- Differentiate $e^{\sin x} + (ax)^x$ w.r.t. x .
- If $y = e^x (\sin x + \cos x)$ Prove : $\frac{d^2 y}{dx^2} - \frac{2dy}{dx} + 2y = 0$
- If $x = 3 \sin t - \sin 3t$, $y = 3 \cos t - \cos 3t$ find $\frac{d^2 y}{dx^2}$ at $t = \frac{\pi}{4}$

20. Find dy if (i) $x = a + t^2$, $y = 2t$ (ii) $x = 1 + 10gt$, $y = 2 \sin \square$
21. Find $\frac{dy}{dx}$, if (i) $x = a \frac{(1+t^2)}{1-t^2}$, $y = \frac{2t}{1-t^2}$, (ii) $x = \frac{1 + \log t}{E^2}$, $y = 2 \sin \square - \sin^2 \square$ (iii) $x^y = y^x$
22. If $e^y (x+1) = 1$, Prove that $\frac{dy}{dx} = \left(\frac{dy}{dx}\right)^2$
23. If $x^4 = c^{x-y}$, then prove that $\frac{dy}{dx} = \frac{\log x}{\log(ex)^2}$
24. If $\sin(x, y) = x^2 - y$, find $\frac{dy}{dx}$
25. If $e^x + e^y = e^{x+y}$ prove that $\frac{dy}{dx} = e^{y-x}$
26. Find $\frac{dy}{dx}$ if $\cos(x+y) = y \sin a$.
27. If $x \sqrt{1+y} = y \cdot \sqrt{1+x} = 0$ then prove that $\frac{dy}{dx} = \frac{-1}{\sqrt{1+x^2}}$
28. If $x \sqrt{1-y^2} + y \sqrt{1-x^2} = 1$, then prove $\frac{dy}{dx} = \frac{\sqrt{1-y^2}}{\sqrt{1-x^2}}$
29. If $y = x(a+y)$ show: $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$
30. If $\sqrt{1-x^2} + \sqrt{1-y^2} = a(x-y)$, prove $\frac{dy}{dx} = \frac{\sqrt{1-y^2}}{\sqrt{1-x^2}}$