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WORKSHEET NO. 5

Differentiation & Continuity.

Qns 1 → $x = a\sin t - b\cos t$

$y = a\cos t + b\sin t$

Show that $\frac{d^2y}{dx^2} = -\frac{(x^2+y^2)}{y^3}$

Qns 2 → $y = \log(1+\cos x)$ show that

$$\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2}\cdot\frac{dy}{dx} = 0$$

Qns 3 → $y = \cos^{-1}x$ find $\frac{d^2y}{dx^2}$ in terms of y alone

Ans $-\cot y \cdot \operatorname{cosec}^2 y$

Q.N. 4 → If $y = x^x$

Show that $\frac{d^2y}{dx^2} - \frac{1}{y}\left(\frac{dy}{dx}\right)^2 - \frac{y}{x} = 0$

Qns 5 → If $\cos y = x\cos(a+y)$ show that

$$\frac{dy}{dx} = \frac{\cos^2(a+y)}{\sin a}$$

Qns 6 → If $x\sin(a+y) + \sin a\cdot\cos(a+y) = 0$

Show that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$

Qns 7 → If $\sqrt{1-x^2} + \sqrt{1-y^2} = a(x-y)$ show that

$$\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$$

Q.No 8 → If $y\sqrt{1-x^2} + x\sqrt{1-y^2} = 1$
Show that $\frac{dy}{dx} = -\sqrt{\frac{1-y^2}{1-x^2}}$

Q.No.9 → If $x\sqrt{1+y} + y\sqrt{1+x} = 0$ Show that
$(1+x)^2 \frac{dy}{dx} + 1 = 0$

Q.No.10 → If $y\sqrt{x^2+1} = \log(\sqrt{x^2+1}-x)$ Show that
$(x^2+1)\frac{dy}{dx} + xy + 1 = 0$

Q.No 11 → If $e^x + e^y = e^{x+y}$
Show that $\frac{dy}{dx} = -\frac{e^x(e^y-1)}{e^y(e^x-1)}$

Q.No.12 → If $\sqrt{y+x} + \sqrt{y-x} = c$
Show that $\frac{dy}{dx} = \frac{y}{x} - \sqrt{\frac{y^2}{x^2}-1}$

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