

Set 03

① Differentiate

$$y = \cos^{-1} \left\{ \frac{2x-3\sqrt{1-x^2}}{\sqrt{13}} \right\}$$

② $y = \sin^{-1} \{ 6x\sqrt{1-9x^2} \}$ find $\frac{dy}{dx}$?

③ If $x\sqrt{1+y} + y\sqrt{1+x} = 0$ and $x \neq y$

Prove that $\frac{dy}{dx} = \frac{-1}{(x+y)^2}$

④ If $\cos^{-1} \left\{ \frac{x^2-y^2}{x^2+y^2} \right\} = \tan^{-1} a$ prove that $\frac{dy}{dx} = \frac{y}{x}$

⑤ If $\sin y = a \sin(a+y)$ prove that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$

⑥ If $\sqrt{1-x^6} + \sqrt{1-y^6} = a(x^3 - y^3)$ prove that $\frac{dy}{dx} = \frac{x^2}{y^2} \frac{\sqrt{1-y^6}}{\sqrt{1-x^6}}$

⑦ If $x \sin(a+y) + \sin a \cos(a+y) = 0$ prove that $\frac{dy}{dx} = \frac{\sin^2(a+y)}{\sin a}$

⑧ If $e^x + e^y = e^{x+y}$ prove that $\frac{dy}{dx} = \frac{-e^x(e^y-1)}{e^y(e^x-1)}$
 or $\frac{dy}{dx} + e^{y-x} = 0$

⑨ If $\sin^2 y + \cos^2 xy = K$ find $\frac{dy}{dx}$ at $x=1, y=\pi/4$

⑩ If $\tan^{-1} \left\{ \frac{x^2-y^2}{x^2+y^2} \right\} = a$ prove that $\frac{dy}{dx} = \frac{x(1-\tan a)}{y(1+\tan a)}$

⑪ If $y\sqrt{1-x^2} + x\sqrt{1-y^2} \geq 1$ prove that $\frac{dy}{dx} = \frac{-\sqrt{1-y^2}}{\sqrt{1-x^2}}$

⑫ If $\sqrt{1-x^2} + \sqrt{1-y^2} = a(x-y)$ P.T. $\frac{dy}{dx} = \frac{\sqrt{1-y^2}}{\sqrt{1-x^2}}$