

Sec 2.5 #10.  $2 \sin x \cos y = 1$  Find  $\frac{dy}{dx}$

$$2 \left( \cos x \cos y + \sin x (-\sin y) \cdot \frac{dy}{dx} \right) = 0 \Rightarrow \frac{dy}{dx} = \frac{\cos x \cos y}{\sin x \sin y}$$

#32.  $x^3 + y^3 - 6xy = 0$ . Find  $\frac{dy}{dx}$  @  $(\frac{4}{3}, \frac{8}{3})$

$$3x^2 + 3y^2 \frac{dy}{dx} - 6(y + x \frac{dy}{dx}) = 0 \Rightarrow$$

$$\frac{dy}{dx} = \frac{-3x^2 + 6y}{3y^2 - 6x} \Rightarrow \frac{dy}{dx} \left( \frac{4}{3}, \frac{8}{3} \right) = \frac{-3(\frac{4}{3})^2 + 6 \cdot \frac{8}{3}}{3(\frac{8}{3})^2 - 6 \cdot \frac{4}{3}} = \frac{4}{5}$$

#38.  $x^{2/3} + y^{2/3} = 5$ . Find  $\frac{dy}{dx}$  @  $(8, 1)$

$$\frac{2}{3} x^{-1/3} + \frac{2}{3} y^{-1/3} \cdot \frac{dy}{dx} = 0 \Rightarrow \frac{dy}{dx} = -\frac{x^{-1/3}}{y^{-1/3}} = -\frac{\sqrt[3]{y}}{\sqrt[3]{x}}$$

$$\Rightarrow \frac{dy}{dx} (8, 1) = -\frac{\sqrt[3]{1}}{\sqrt[3]{8}} = -\frac{1}{2} \Rightarrow \text{tangent line: } y - 1 = -\frac{1}{2}(x - 8)$$

$$\boxed{y = -\frac{1}{2}x + 5}$$

(b) #52.  $y^2 = \frac{x-1}{x^2+1}$  Tangent line at  $(2, \frac{\sqrt{5}}{5})$

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

$$\frac{dy}{dx} \left( 2, \frac{\sqrt{5}}{5} \right) = \frac{-2^2 + 2 \cdot 2 + 1}{(2^2+1)^2 \cdot 2 \cdot (\frac{\sqrt{5}}{5})} = \frac{1}{10\sqrt{5}} = \frac{\sqrt{5}}{50} = \text{slope}$$

tangent line

$$y - \frac{\sqrt{5}}{5} = \frac{\sqrt{5}}{50} (x - 2)$$

$$\boxed{y = \frac{\sqrt{5}}{50} x + 2 + \frac{\sqrt{5}}{5}}$$