

$$45) y = \ln x^4 \quad (1, 0)$$

$$\frac{dy}{dx} = \frac{4x^3}{x^4} = \frac{4}{x}$$

$$m = \frac{4}{1} = 4$$

$$y = 4x + b$$

$$0 = 4(1) + b$$

$$\rightarrow b = -4$$

$$y = 4x - 4$$

$$83) x^2 - 3 \ln y + y^2 = 10$$

$$2x - 3 \frac{1}{y} \frac{dy}{dx} + 2y \frac{dy}{dx} = 0$$

$$\left(-\frac{3}{y} + 2y\right) \frac{dy}{dx} = -2x$$

$$\frac{dy}{dx} = \frac{-2x}{\left(-\frac{3}{y} + 2y\right)}$$

$$\frac{(2x)y}{\left(\frac{3}{y} - 2y\right)y} = \frac{2xy}{3 - 2y^2}$$

$$81) y = 2 \ln x + 3$$

$$y' = \frac{2}{x} = 2x^{-1}$$

$$y'' = \frac{-2}{x^2}$$

$$xy'' + y' = 0$$

$$x \left(\frac{-2}{x^2}\right) + \frac{2}{x} = 0$$

$$-\frac{2}{x} + \frac{2}{x} = 0$$

$$0 = 0$$

$$93) y = x \ln x \quad \text{Domain } (0, \infty)$$

$$y' = 1 \cdot \ln x + x \cdot \frac{1}{x}$$

$$y' = \ln x + 1 \quad y''(x) = \frac{1}{x}$$

$$0 = \ln x + 1$$

$$\rightarrow \ln x = -1$$

$$\frac{1}{e} = e^{-1} = x$$

$$y''\left(\frac{1}{e}\right) = e$$

\Rightarrow min

y'' undef. at 0