3.8. HW Problem

a) $\frac{dy}{dx} = ?$ $\quad x^{1/3} + y^{1/3} = 3 \; ; \; (1,8)$ $\quad$ b) $m_{tan}\big|_{(1,8)}$

a) $\frac{1}{3} \cdot x^{-2/3} + \frac{1}{3} \cdot y^{-2/3} \cdot \frac{dy}{dx} = 0$

$$\frac{\frac{1}{3} \cdot y^{-2/3} \cdot \frac{dy}{dx}}{y^{-2/3}} = \frac{-\frac{1}{3} x^{-2/3}}{y^{-2/3}} \Rightarrow \frac{dy}{dx} = -\frac{x^{-2/3}}{y^{-2/3}}$$

$$\frac{dy}{dx} = -\frac{y^{2/3}}{x^{2/3}}$$

b) $m_{tan}\big|_{(1,8)} = \frac{dy}{dx}\Big|_{(1,8)} = \frac{-y^{2/3}}{x^{2/3}}\Big|_{(1,8)}$

$$= \frac{-8^{2/3}}{1^{2/3}} = \frac{-(2^3)^{2/3}}{1} = \boxed{-4}$$