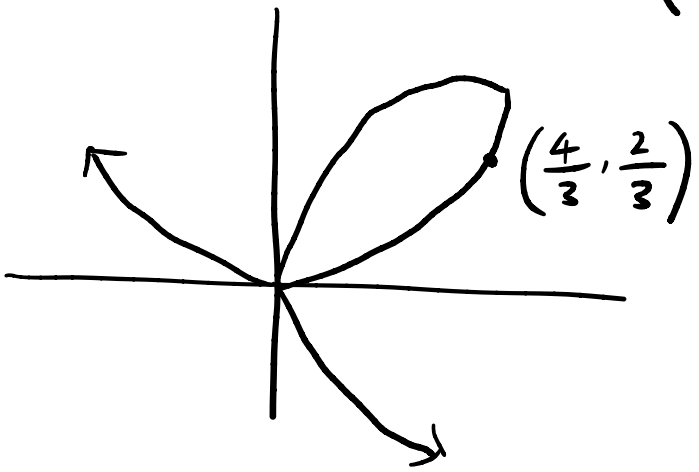
What is the slope of the tangent line to the curve $y^3 + x^3 = 3xy$ at the point $\left(\frac{4}{3}, \frac{2}{3}\right)$?



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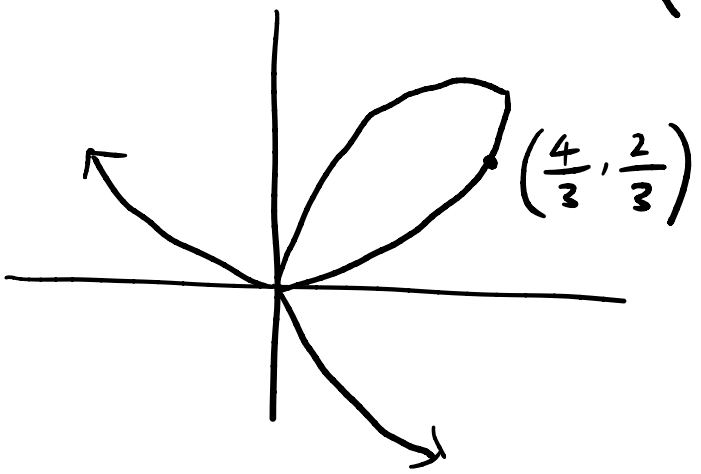

$$\frac{d}{dx}(y^3 + x^3) = \frac{d}{dx}(3xy)$$

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

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

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

The slope of the tangent line to the curve is the derivative of the curve at that point.

$$\text{At } \left(\frac{4}{3}, \frac{2}{3}\right), \frac{dy}{dx} = \frac{\frac{2}{3} - \frac{16}{9}}{\frac{4}{9} - \frac{4}{3}} = \frac{-\frac{10}{9}}{-\frac{8}{9}} = \frac{10}{8} = \frac{5}{4}$$

$\therefore$ The slope of the tangent line at $\left(\frac{4}{3}, \frac{2}{3}\right)$ is $\frac{5}{4}$.