

**Problem Definition**

Problem 23. Find  $dy/dx$  and evaluate the derivative at the given point.

$$x^{2/3} + y^{2/3} = 5 \quad (8, 1)$$

**Solution Step 1:****Solution Step 1:**

We need the derivative expression in order to evaluate the function at the given point. So, differentiate both sides of the equation with respect to  $x$ .

$$\frac{d}{dx}(x^{2/3} + y^{2/3}) = \frac{d}{dx}(5)$$

or

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

Solving for the derivative gives

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

**Solution Step 2:**

At the given point  $(8, 1)$  we can write

$$\frac{dy}{dx} = -\sqrt[3]{\frac{1}{8}}$$

or

$$\frac{dy}{dx} = -\frac{1}{2}$$