Problem Definition

Problem 5. Find $dy/dx$.

$$x^2y^2 - 4y = 1$$

Solution Step 1:

The process starts by computing the derivative of both sides of the equation with respect to $x$. The differentiated equation is given by

$$\frac{d}{dx}(x^2y^2 - 4y) = \frac{d}{dx}(1)$$

or

$$2xy^2 + x^2(2y\frac{dy}{dx}) - 4\frac{dy}{dx} = 0$$

The result is an equation that will allow use to solve for $dy/dx$.

Solution Step 2:

The solution steps result in the following sequence of equations.

$$2xy^2 + x^2(2y\frac{dy}{dx}) - 4\frac{dy}{dx} = 0$$

$$2xy^2 + 2x^2y\frac{dy}{dx} - 4\frac{dy}{dx} = 0$$

$$(2x^2y - 4)\frac{dy}{dx} = -2xy^2$$

$$\frac{dy}{dx} = -\frac{2xy^2}{(2x^2y - 4)}$$

or finally, we can write

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