Quiz 5

June Weiland

October 7th, 2022

Problem 1. Use implicit differentiation to find $\frac{dy}{dx}$ for the following equations

(a) $2x^4 = 4y^2 + 6x^2$

(b) and $e^{2xy} = 6x$.

Solution:

(a) We begin by differentiating both sides of the equation with respect to x,

$$\frac{d}{dx}[2x^4] = \frac{d}{dx}[4y^2 + 6x^2]$$
$$8x^3 = 8y\frac{dy}{dx} + 12x.$$

Finally we solve for dy/dx and see that

$$\frac{dy}{dx} = \frac{8x^3 - 12x}{8y} = \frac{2x^3 - 3x}{2y}.$$

(b) First we differentiate both sides of the equation with respect to x and obtain

$$\frac{d}{dx}[e^{2xy}] = \frac{d}{dx}[6x]$$
$$e^{2xy}\frac{d}{dx}[2xy] = 6$$
$$e^{2xy}(2y + 2x\frac{dy}{dx}) = 6.$$

Finally, we solve for dy/dx and hence

$$\frac{dy}{dx} = \frac{3 - ye^{2xy}}{xe^{2xy}}.$$