

Math 220 - Calculus f. Business and Management - Worksheet 20

Worksheet 20 - Implicit Differentiation

Exercise 1: Assume y is a function of x . Find dy/dx using implicit differentiation:

$$\begin{array}{lll} \mathbf{1a} : 8y - x^2y^3 = 6, & \mathbf{1b} : xy^2 + yx^2 + 2y = 3x^4 + 5, & \mathbf{1c} : y \cdot e^x + 4 = x^{5/2}y^2, \\ \mathbf{1d} : x^3 \ln(y) = 6\sqrt{x}. \end{array}$$

Exercise 2: The equation

$$qp = 6000 - p^2$$

represents how price p and demand q for a product are related. Assume demand is a function of price. First find dq/dp using implicit differentiation. Then solve the equation a second time for q and find dq/dp using normal differentiation. Your two answers should be the same.

Exercise 3: Find an equation for the line tangent to each curve at the given point:

$$\mathbf{3a} : 16y^2 + 4x^2 = 100 \quad \text{at } (3, 2), \quad \mathbf{3b} : y\sqrt{x} = 3x\sqrt{y} - 10 \quad \text{at } (4, 1).$$