

Math 220 – Business Calculus
Spring 2013 Quiz 4
Implicit Differentiation and Related Rates

- 7 pts 1. Find the equation for the line tangent to the curve described in this equation at the point (3,2)

$$x^3y - 4y = 70 - 2xy^2$$

$$3x^2y + x^3 \frac{dy}{dx} - 4 \frac{dy}{dx} = -2y^2 - 2x \cdot 2y \frac{dy}{dx}$$

$$\frac{dy}{dx} = \frac{-2y^2 - 3x^2y}{x^3 - 4 + 4xy} = \frac{-62}{47}$$

$$y - 2 = -\frac{44}{47}(x - 3)$$

- 6 pts 2. The demand for a product is given as a function of price: $q = \frac{450}{p}$. The price is currently \$3.00. How fast will the demand change if the price changes at a rate of \$0.10/month?

$$\frac{dq}{dt} = -\frac{450}{p^2} \frac{dp}{dt} = -\frac{450}{9} (0.10)$$

$$= -5 \text{ products/month}$$

- 7 pts 3. A field is 100m long and 40m wide. Cost of grass to cover the field is increasing at a rate of \$0.50/month. How fast is the cost to cover the field increasing when the cost of grass is \$15.00/m²?

$$A = 4000 \text{ m}^2$$

$$C = (4000)p$$

p = price of grass

C = cost for the whole field

$$\frac{dC}{dt} = 4000 \frac{dp}{dt}$$

$$= 4000 (0.5) = \$2000/\text{mo.}$$