

Review Problems

Midterm 3

November 17, 2007

1. **Problem 1** - Find the derivative of the following functions.

(a) $g(x) = 3\log_5(4x + 7)$.

Answer: $y' = \frac{12}{(\ln 5)(4x+7)}$

(b) $y = \frac{e^{x^3+1}}{x}$.

Answer: $y' = \frac{e^{x^3+1}(3x^3-1)}{x^2}$

(c) $y = x^2 5^x$

Answer: $y' = 5^x(2x + x^2 \ln 5)$

(d) Find dy/dx in the equation $\log_2 y - x = 5$

Answer: $dy/dx = y \ln 2$

2. **Problem 2**-Problem 33, page 778

Answer: (a) $y'(1) = 0$; (b) $y = e^{-1}$

3. **Problem 3** - Implicit Differentiation
Problem 45 page 790

Answer: $y = 3 - x$

4. **Problem 4** - Suppose that the demand for a product is given by $pq + p = 100$.
(a) Find the elasticity when $p = \$10$, $q = 9$.

(b) Tell what type of elasticity this is : unitary, elastic, or inelastic.

(c) How would revenue be affected by a price decrease?

Answer: (a) $10/9$; (b) elastic; (c) revenue will increase .

5. **Problem 5** - Problem 36 page 808

Answer: $t = \$880$, $T = \$3520$

6. **Problem 6** - Evaluate the following integrals

(a) $\int (4 + \sqrt{x} - \frac{1}{x^2}) dx$

Answer: $4x + \frac{2x^{3/2}}{3} + \frac{1}{x} + C$

(b) $\int 7x^3 \sqrt{x^4 + 6} dx$

Answer: $\frac{7}{6}(x^4 + 6)^{3/2} + C$

(c) $\int \frac{5x}{e^{x^2}} dx$.

Answer: $\frac{-5}{2}e^{-x^2} + C$

7. **Problem 7** - Revenue

Suppose that the marginal revenue for a product is given by

$$\overline{MR} = \frac{600}{\sqrt{3x+1}} + 2$$

Find the total revenue when level of production, x , equals to 5. (NOTE: $R(0) = 0$.)

Answer: $R(x) = 400\sqrt{3x+1} + 2x - 400$; $R(5) = 1210$