

Review: from section 12.3 to section 13.2

Final

December 8, 2007

1. **Problem 1** - Evaluate the following integrals

(a)  $\int \frac{x^3}{(2x^4-5)} dx$

**Answer:**  $\frac{\ln|2x^4-5|}{8} + C$

(b)  $\int (e^x + \frac{5}{x} - 1) dx$

**Answer:**  $e^x + 5\ln|x| - x + C$

2. **Problem 2** - Profit and Optimal Level of Production

A firm knows that its marginal cost for a product is  $\overline{MC} = 4x + 40$ , that its marginal revenue is  $\overline{MR} = 500$ , and the cost of production and sale of 10 units is \$1000.

- (a) Find the optimal level of production

**Answer:**  $x = 115$

- (b) Find the profit function

**Answer:**  $P(x) = 460x - 2x^2 - 400$

(c) Find the profit or loss at the optimal level

**Answer:**  $P(x) = 26050$

3. **Problem 3** - National Consumption

If consumption is \$5 billion when disposable income is 0, and if the marginal propensity to save is

$$\frac{dC}{dy} = 0.22 + \frac{0.25}{\sqrt{.5y + 1}} \quad (\text{in billions of dollars})$$

find the national consumption function

**Answer:**  $C(x) = 0.22y + \sqrt{0.5y + 1} + 4$

4. **Problem 4** - Area under the Curve

Approximate the area under the graph of  $y = 9 - x^2$  on the interval  $[0, 3]$  by evaluating the function at the right-hand endpoints of the subintervals (using 6 subintervals).

**Answer:**  $Area = 125/4 = 31.25$

5. **Problem 5** - Definite Integrals - Evaluate the following integrals

(a)  $\int_3^2 \frac{x^2}{(2x^3-7)} dx$

**Answer:**  $-\frac{1}{6}\ln 47 + \frac{1}{6}\ln 9$

(b)  $\int_1^4 4\sqrt{x^3} dx$

**Answer:**  $\frac{248}{5}$

6. **Problem 3** - Properties of Definite Integrals

(a) Problem 45, page 888

**Answer:** 6

(b) Problem 46, page 888

**Answer:** 4

(c) Problem 43, page 888

**Answer:** Opposite signs, same magnitude