

MAC2233 Quiz 4

Please write your answers to the following questions in the spaces provided. You must show your work to receive credit. **Round all decimal answers to 3 decimal places.**

1. (10 points) Suppose that the cost, in dollars, for a company to produce x pairs of shoes is

$$C(x) = 1400 + 4x + 0.06x^2 + 0.0009x^3.$$

(a) Find the marginal cost function

(b) Find $C'(200)$. What is the meaning of this quantity?

(c) Find the actual cost of producing the 201st pair of shoes.

2. (9 points) A manufacturer of power supplies estimates that it will incur a total cost of

$$C(q) = 2900 + 4q + 0.004q^2$$

dollars when producing q power supplies, and it will collect

$$R(q) = 14q - 0.004q^2$$

dollars in revenue.

(a) Write a function for the profit P the manufacturer can expect after producing q power supplies.

(b) Find the marginal cost and marginal revenue functions.

(c) How many power supplies should the manufacturer produce in order to maximize profit?

3. (7 points) Given the cost and demand functions, find the production level that will maximize profit.

$$C(q) = 540 + 3q + 0.01q^2, \quad p = 12 - q/250$$

4. (5 points) Differentiate using the appropriate derivative rule (not the definition of the derivative).

$$y = (w^2 - 14w)e^w$$

5. (7 points) Find the slope of the curve at the given x -value. To find this, you will need to use the appropriate derivative rule.

$$y = \frac{x}{x^2 - 1}, \quad x = 3.$$