

MATH 10250 Practice Exam 2 - Extras

1. The weekly demand for a certain product is given by the demand equation

$$p = 20 - 4x$$

where p denotes the wholesale unit price in dollars and x denotes the quantity demanded. The weekly total cost function for manufacturing the products is given by

$$C(x) = -2x^2 + 10x + 12$$

where $C(x)$ denotes the total cost incurred in producing x units.

- (a) Find the **revenue** function.
- (b) Find the **marginal revenue** function.
- (c) Compute the **marginal revenue** when $x = 2$.
- (d) Compute the **marginal cost** function.
- (e) Compute the **profit** function.
- (f) Compute the **marginal profit** when $x = 2$.

2. (a) Compute the **elasticity of demand** when $p = 18$ given the demand equation:

$$3x + p = 27$$

(b) Is the demand inelastic, elastic, or unitary at $p = 18$? Why?

(c) What will happen to the revenue if you decide to increase the price to 19?

(d) How should you adjust the price in order to increase the revenue?

3. Given $f(x) = x^3 - 3x^2 - 24x + 32$

(a) Find the interval of **increasing** and **decreasing** of f . List all the **critical numbers** of f .

(b) Find the **relative maximum** and **relative minimum** of f .

(c) Find the interval of **concavity** of f . Where is the **inflection point(s)** of f ?

4. Find the **absolute maximum value** and **absolute minimum value** of $g(x) = 2x + \frac{8}{x}$ on $[1, 8]$.

5. Find the **horizontal asymptote(s)** and **vertical asymptote(s)** of

(a) $f(x) = \frac{x^2 + x}{2x + 1}$

(b) $g(x) = \frac{x^2}{4x^2 - 4}$

(c) $h(x) = \frac{1}{x^4}$

6. The management of Trappee and Sons, producers of the famous TexaPep hot sauce, estimate that their profit from the daily production and sale of x cases of the hot sauce is given by

$$P(x) = -2x^3 + 6x + 40$$

How many cases of hot sauce that the company should produce and sell in order to maximize its profit? What will that maximum profit they can get in one day?

7. Use implicit differentiation to find $\frac{dy}{dx}$ when $x = 1$ and $y = 5$ given

$$x^3 - y^2 = y - 29$$

8. Suppose the quantity demanded weekly of a certain commodity is related to its unit price by the equation

$$x^2 + 2p = 40$$

where p is the price per unit (in dollars) and x is the quantity demanded. How fast is the price changing weekly when the the demanded quantity is 5 and the quantity demanded is decreasing at the rate 3 units per week?