MATH 1120 **Test 1** **Fall 2000**

Name : _____

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1. p denotes the wholesale unit price of a product in dollars and x denotes the quantity demanded each week. Between p and x there is the following relation $p = 600 - 0.5x$ $(0 \leq x \leq 1200)$, which is called the demand equation. The weekly total cost function for manufacturing x units of the product is given by $C(x) = 1500 + 200x$.

   (a) Find the revenue function R.

   (b) Find the profit function P.

   (c) What is the average cost if 250 items are produced per week?

   (d) What is the value of the marginal profit function when $x = 250$?

2. For the following pair of supply and demand equations, where x represents the quantity demanded in units of a thousand and p the unit price in dollars, find the equilibrium quantity and price:

$$p = 0.2x^2 + x + 30, \qquad p = -1.8x^2 + 3x + 70.$$

3. Find the following limits:

   (a) $\lim_{x\to\infty} \frac{2x^3+4x}{5x^3-6x^2} =$

   (b) $\lim_{h\to 0} \frac{(x+h)^2-x^2}{h} =$

4. (a) Find the slope of the tangent line to the graph of $y = 2x^4 + 3$ at the point (1,5);

   (b) Find an equation of the tangent line to the graph of $y = 2x^4 + 3$ at the point (1,5).

5. Find the derivative of each of the following functions:

(a) $f(x) = x^6 + 2x^4 + 8$;

(b) $f(x) = \frac{1}{x^2} + \sqrt{x}$;

(c) $f(x) = (5x^2 + 6)(7x^4 + 8)$;

(d) $f(x) = \frac{x^2}{2x^3+3}$;

(e) $f(x) = \sqrt{x^2 + 5}$;

(f) $f(x) = (x^4 + 1)^{100}(5x + 2)^{50}$.