

**MATH 1120**

**Test 1**

**Summer 2002**

Name : \_\_\_\_\_

**SHOW THE DETAILS OF YOUR WORK**      ID : \_\_\_\_\_

1. A manufacturer has a weekly fixed cost of \$20,000 and a production cost of \$250 for each unit produced. The product sells for \$400 per unit. The manufacturer produces  $x$  units per week. In this case,

(a) the cost function  $C(x) =$

(b) the revenue function  $R(x) =$

(c) the profit function  $P(x) =$

(d) What is the average cost if 400 items are produced per week?

(e) What is the value of the marginal profit function when  $x = 400$  ?

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:

$$p = 0.1x^2 + x + 60, \quad p = -0.2x^2 - 0.5x + 150.$$

3. Find the following limits:

(a)  $\lim_{x \rightarrow 1} \frac{x+2}{x+5} =$

(b)  $\lim_{x \rightarrow \infty} \frac{6x^3+5x}{3x^3-4x} =$

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

4. (a) Find the slope of the tangent line to the graph of  $y = 2x^2 + 5$  at the point  $(1,7)$ ;

- (b) Find an equation of the tangent line to the graph of  $y = 2x^2 + 5$  at the point  $(1,7)$ .

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

(a)  $f(x) = 4x^2 + 3x + 5;$

(b)  $f(x) = \sqrt{x} - \frac{3}{\sqrt{x}};$

(c)  $f(x) = (x^2 + 3)(2x^3 + x^2 + 1);$

(d)  $f(x) = \frac{x^2}{5x^2+4};$

(e)  $f(x) = (x^2 + 1)^{1/3};$

(f)  $f(x) = \sqrt{\frac{3x+2}{x+2}}.$

(g)  $f(x) = (3x^2 + 4)^{20}(5x^4 - 6)^{30}.$