Math 205 Exam I

7:30pm–8:30pm, Thursday, February 3, 2005

Instructor:_____ **Class Time:**_____ **Name:**_____

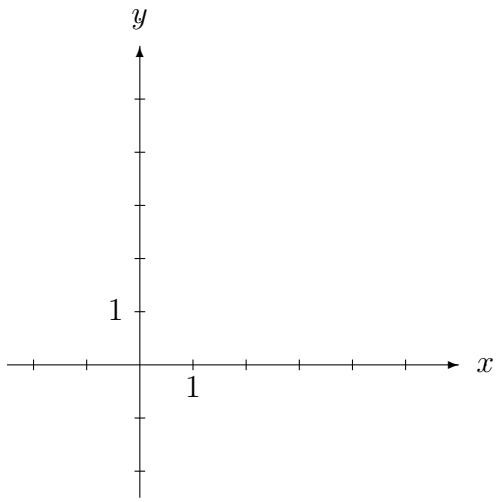
No books or notes are allowed. Please read the problems carefully and do **all** you are asked to do. **You must show your work!** You can use the back page as a scratch paper. Do the problems at the space provided.

Total/100	#1	#2	#3	#4	#5	#6	#7	#8

1(total points: 13). Suppose that the graph of a linear function $y = f(x)$ contains the points $(-2, 3)$ and $(4, 0)$.

(a)**(5 points).** Find the slope m.

(b)**(5 points).** Find the vertical intercept b.



(c)**(3 points).** Sketch the graph of $f(x)$ on the given coordinate system.

2(total points: 12). Values of a linear cost function in dollars are in the following table.

q	0	5	10	15	20
$C(q)$	5000	5020	5040	5060	5080

(a)**(6 points).** Find a formula for the cost function.

(b)**(6 points).** Assume that the company sell the product at the price of 12 dollars per item. Find the break–even point.

3(total points: 13). The supply and demand curves for a certain product are given in terms of price, p, by

$$S(p) = 30p - 5000 \text{ and } D(p) = 10000 - 20p.$$

(a)**(5 points).** Find the equilibrium price and quantity.

(b)**(5 points).** If a specific tax of \$40 per unit is imposed on producers, find the new equilibrium price and quantity.

(c)**(3 points).** How much of the \$40 tax is payed by the consumers, and how much by producers?

4(total points: 12). In each of the items (a)–(d), determine if the function is a power function. If it is a power function, write it in the form $y = kx^p$ and give the values of the coefficient k and the exponent p.

(a)**(3 points).** $y = 5\sqrt{x}$.

(b)**(3 points).** $y = 3 \cdot 4^x$.

(c)**(3 points).** $y = \frac{1}{5x}$.

(d)**(3 points).** $y = (2x^2)^3$.

5(total points: 12). Solve the following equation for t (You should use your calculator to find a decimal approximation).

$$2 \cdot 3^t = 5 \cdot 2^t.$$

6(total points: 13). A cup of coffee contains 100 mg of caffeine, which leaves the body at a continuous rate of 17% per hour.

(a)**(6 points).** Write a formula for the amount, A mg, of caffeine in the body t hours after drinking a cup of coffee.

(b)**(7 points).** Use logarithms to find the half-life of the caffeine.

7(total points: 12). The following table gives partial data of a function $f(x)$.

x	0	1	2	3
$f(x)$	50000	60000	72000	86400

Answer the following questions (You must show your work).

(a)**(6 points).** Could the function $f(x)$ be linear or exponential?

(b)**(6 points).** Find a formula for the function.

8(total points: 13). Let $f(x) = x^3 - 1$ and $g(x) = x + 1$. Find the following (no need for simplification).

(a)**(5 points).** $f(g(x))$

(b)**(4 points).** $g(f(x))$

(c)**(3 points).** $f(f(x))$.