MATH 122 Spring, 2004 Exam #1 Name:_____

There are 100 points. For full credit you must show your work.

1. (15 points) Assuming L is a linear function of t, fill in the missing values in the table and find a formula for L as a function of t.

t		-1	0	1		4
L	10	6		2	0	-4

2. (15 points) There were $56,050$ cars imported to the U.S. from Japan in 1966, and the number of Japanese imports grew at a discrete rate of 72% a year until 1972.

   a. How many Japanese cars were imported in 1968?

   b. Give a formula for the number of Japanese imports, $N(t)$, where t is measured in years since 1966. How many cars were imported in 1965?

3. (15 points) A company that makes overpriced retro style blenders has fixed costs of $16,800 and variable costs of $45 per machine. The company plans to sell the machines for $125 each. Let q represent the number of blenders. Give formulas for the cost function $C(q)$ and the revenue function $R(q)$. What is the break-even point in terms of number of blenders?

4. (10 points) The graph of a certain function f is shown below.
   a. This graph shows _____ as a function of _____ .
   b. Compute the average rate of change from $x = 4$ to $x = 9$, and illustrate the geometric meaning of this computation.

   b. For which values of x is the graph concave up?

5. (15 points) When X-rays pass through a heavy concrete shield the intensity of the radiation R decreases exponentially; that is, $R = R_0 e^{kx}$. The initial amount is R_0, the thickness of the concrete is x, and the "decay" rate is k. It takes 3 feet of concrete to remove 75% of the X-ray radiation (so 25% remains).
   a. Determine the decay rate k.

   b. How thick a shield is required to reduce the radiation by 99%?

6. (15 points) Determine if w is a discrete exponential function or a linear function of x. Explain! Your answer must show that you have used all the values given in the table below.

x	-2	-1	0	1	2	3
w		75	60	48	38.4	30.72

a. Write the formula for w as a function of x and fill in the value $w(-2)$.

b. Write w_x in terms of w_{x-1}.

7. (15 points) A demand curve is given by the equation $75p + 50q = 300$, where p is the selling price in dollars, q is the quantity demanded at that price. Determine the intercepts of this graph, sketch the graph, and give the real world meaning of the intercepts.