MAT 194 **Name_____**
Test #1 **Sept 25, 2009**

Show all work! Answer all questions!

(1) [16 pts] Find the average rate of change of $f(x) = 3x^2 - x$ between the points:

(a) $(-2, f(-2))$ and $(3, f(3))$

(b) $(x, f(x))$ and $(x+h, f(x+h))$. Simplify this answer.

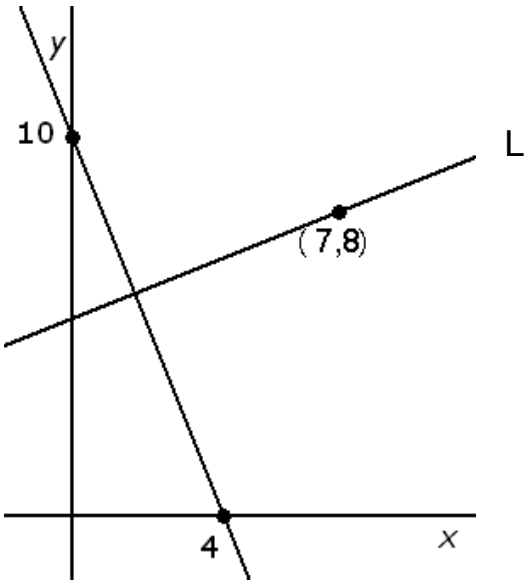
(2) [8 pts] Simplify the following expression:

$(6AB)^{-3}\ (A^2B^{-3})^2$

(3) [8 pts] Simplify the following expression:

$$\frac{x^{-6}+7x^{-12}}{1-49x^{-12}}$$

(4) [12 pts] The lines shown in the graph below are perpendicular. Find an equation of the line **L**. Leave your answer in exact values (not in decimal numbers).



(5) [12 pts] Which of the following tables could represent a linear function? Justify your answer!

t	0	1	2	3
$p(t)$	1000	1400	1600	1700

t	0	1	3	5
$g(t)$	0.6	0.95	1.65	2.35

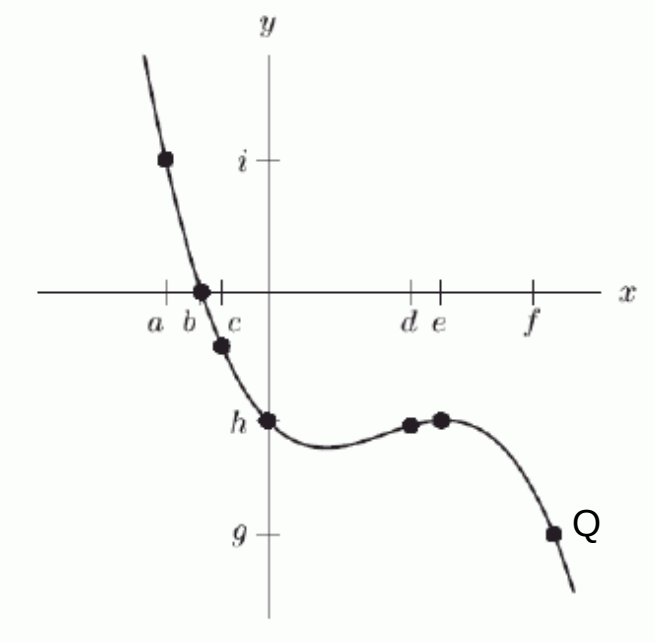
(6) [16 pts] An athlete wants to strengthen his cardiovascular system by bench pressing a weight, *w*, as many times, *N*, as possible. The following table shows the relationship between *N* and *w*.

weight, *w* (in pounds)	130	140	150	160
max # of bench presses, *N*	29	26	23	20

(a) Write an equation for *N* as a function of *w*. Leave your answer in exact values (not decimal numbers).

(b) What is the physical meaning of the slope in your equation?

(7) [12 pts] Let $y = p(x)$ be defined by the following graph.



(a) Solve $p(x) = i$ for x.

(b) What are the coordinates of Q?

(c) Evaluate $p(d)$.

(d) For what value of x, does $p(x) = 0$?

(8) [16 pts] An electric company charges for electricity usage according to the formula below, where the usage x is measured in kilowatt hours (kwh), and the charges are in dollars.

$$C(x) = \begin{cases} 9 & , \ 0 \le x \le 1000 \\ .05x - 41 & , \ 1000 < x \le 4000 \\ .03x + 39 & , \ 4000 < x \end{cases}$$

(a) Sketch a graph of this function. Be sure to label the axes and show the scale.

(b) Evaluate $C(100)$. What is the meaning of this quantity? What are its units?

(c) Interpret the meaning of the slope of 0.03 in terms of the problem situation.