Name _____

Homework #5, Math 102, Fall 2008

Instructions: Put all answers on the homework sheet and attach pages to show work. All work must be shown to receive credit. All answers must be exact unless otherwise indicated. Simplify answers as much as possible even if not specifically noted.

1. Find an equation with the list of properties in each part. You should have one equation per part. Write your answer in the specified form.
   a. An equation with a slope of $\frac{2}{7}$ and passing through the point $\left(0,-\frac{4}{5}\right)$, in standard form.

   b. An equation with a slope of $-\frac{1}{5}$, passing through the point (4,-6), in slope-intercept form.

   c. An equation passing through the points (-9,-2) and (-3,10), in function notation.

   d. An equation passing through the point (-4,8) and perpendicular to the line 2x-3y=1, in point-slope form.

   e. A horizontal line passing through the point (4,5).

   f. A line perpendicular to the line y=3, and passing through the point (-2,-3).

2. The value of a building bought in 1990 appreciates, or increases in value, as time passes. Seven years after the building was bought, it was worth $165,000; 12 years after it was bought, it was worth $180,000.
   a. If this relationship between number of years past 1990 and value of building is linear, write an equation describing this relationship.

   b. Use this equation to estimate the value of the home when it was built? In the year 2010?

3. The number of people employed in the US as systems analysts was 431 thousand in 2000. By the year 2010, this number is expected to rise to 689 thousand. Let y be the number of systems analysts (in thousands) employed in the US in the year x, where x=0 represents the year 2000.

a. Write a linear equation that models the number of people (in thousands) employed as systems analysts in the year x.

b. Use this equation to estimate the number of people working as systems analysts in 2008.

c. What is the domain of this function? (Hint: Since systems analysts are people, can there be a negative number of people working as systems analysts?). Give an interpretation of this domain. What years does it cover?

4. Use linear regression techniques to solve the following equations.

a. The number of people receiving car in HMOs has increased between the years 1998 and 2001 according to the American Association of Health Plans.

Year	1988	1990	1992	1994	1996	2001
Number of HMO members	32.7	36.5	41.4	51.1	61.8	73.5

i. Using the data in the table, find the regression equation that best fits the data. (Let x=0 represent the years since 1980)

ii. Predict the number of people receiving care in HMOs in the year 2010 if the trend continues to increase at the same rate.

iii. If this trend continues, predict the year that there will be over 90 million members.

iv. What does the slope of the linear regression equation represent?

v. What does the y-intercept represent?

b. The Super Bowl is the mostly widely watched event on television. The table below gives the average cost for a 30-second commercial for the years 1987 through 2003.

Years since 1970	7	9	17	21	25	29	30	31	33
Commercial Cost in millions	0.1	0.25	0.5	0.75	1.2	1.5	2.2	2.0	2.2

i. Plot the data points on the graph below. Give the x and y dimensions used.

ii. Find the linear regression line to fit the data.

iii. Find the rate at which the cost of a 30-second commercial during the Super Bowl is increasing per year.

iv. If the rate continues to increase at the same rate, predict the cost of a 30-second commercial during the Super Bowl in 2009.

5. Solve each of the equations below by the method specified. If the method specified is graphically, you must show your graph in your work pages to receive credit.
   a. $5(x+1)-3(x-7)=2(x+4)-3$ graphically

   b. $-(w+0.2)=0.3(4-w)$ algebraically

   c. $2(x-8)+x=3(x-6)+2$ graphically

   d. $\frac{5x-1}{6}-3x=\frac{1}{3}+\frac{4x+3}{9}$ graphically

6. Solve the inequalities graphically. Show your graph from your calculator on your work pages and highlight the portion of the graph that represents your solution. Write the solution here in interval notation.
   a. $7(2x+3)+4x \le 7+5(3x-4)$

   b. $\frac{3x+2}{18}-\frac{1+2x}{6} \le -\frac{1}{2}$