Name: _____ Class: _____ Date: _____ ID: A

Lesson #6 A-2: Understanding Line of Best Fit and Applying Linear Regression (Reference: Lesson #45 in book)

Problem

1. **For each of the following scenerios use your graphing calculator to find the line of best fit or the equation of the regression line, the correlation coefficient, explain the results, and answer the prediction question for each of the scenerios.**

   1. The Census Bureau is checking different marriage statistics and how they have changed over the years, specifically the percentage of people that got married before the age of 25. The accompanying table shows the percent of the adult population that married before the age of 25 over the past 30 years and they are using it to try and predict what could happen in the future. Find the regression line that best models the data, find the correlation coefficient and explain what you see in the data and what the slope of the regression equation means. Use the regression line to predict what the percentage of people in 2009 marry before the age of 25.

YEAR	PERCENT (%)
1971	42.4
1976	37.4
1980	37.1
1984	34.1
1989	32.1
1993	28.8
1997	25.7
2000	25.5

2. A young family is in the market to purchase their first house and have set their eyes on a house that they have just recently seen, but have some questions as to home much the heating bills are per month. The real estate agent has a few bills from the previous owners but all of the bills are based on the average temperature for the month. The follow data is what the real estate agent gave them. Based on this data find the regression line that best models the data, find the correlation coefficient and explain what you see in the data and what the slope of the regression equation means. Use the regression line to predict what the heating bill will be when it is $0°F$ and when it is $40°F$.

AVERAGE TEMPERATURE ($°F$)	MONTHLY HEAT BILL ($)
15	130
22	98
24	75
30	81
49	82
56	65
59	51

3. A factory is producing and stockpiling metal sheets to be shipped to an automobile manufactoring plant. The factory only ships once they have made a minimum of 2,050 sheets. Using the data from the table below find the regression line that best models the data, find the correlation coefficient, and explain what you see in the data and what the slope of the regression equation means. Use the regression line to predict when the company will be able to ship their sheet to the manufactoring plant.

DAY	SHEETS IN STOCK
1	860
2	930
3	1000
4	1150
5	1200
6	1360

4. An agriculturalist was interested in the effects of fertilizer load on the yield of grass. Grass seed was sown uniformily over an area and different quantities of commerical fertilizer were applied to each of the plots. Two months later the grass from each plot was harvested, dried and weighed. The data belows are the results from the experiment. Using the data, find the regression line that best models the data, find the correlation coefficient and determine if that is a significant relationship between the two factors, and explain what you see in the data and what the slope of the regression equation means. Use the regression line to predict how much grass would yield from using 175 units of fertilizer.

FERTILIZER (mass)	YIELD OF GRASS (mass)
25	84
50	80
75	90
100	154
125	148

5. Each time Jen fills the gas tank of her car, she records the number of gallons of gas needed to fill the tank and the number of miles she had driven since the last time she filled the tank. The table below show the data she recored. Using the data from the table, find the regression line that best models the data, find the correlation coefficient, and explain what you see in the data and what the slope of the regression equation means. If Jen needs 8.0 gallon to fill up her tank the next time she goes to get gas, to the nearest mile, how many miles will she have driven? If Jen has driven 200 miles, to the nearest tenth, how many gallons of gas can she expect to need?

GALLONS OF GAS	MILE DRIVEN
7.5	240
8.8	280
5.3	170
9.0	290
8.1	260
4.7	150
6.6	220
8.3	270