Name: ______________________________ Date: ______________

LINEAR REGRESSION ON THE CALCULATOR
COMMON CORE ALGEBRA I

In the last lesson we drew lines of best fit by hand so that we could model **bivariate** data that had been graphed on a **scatter plot**. In this lesson, we will see how to use our calculators to find the **equation of the line of best fit**. This is often referred to as **linear regression**. We will work in the first exercise with a data set from the last lesson.

***Exercise* #1:** A survey was taken of 10 low and high temperatures, in Fahrenheit, in the month of April to try to establish a relationship between a day's low temperature and high temperatures.

Low Temperature, x	26	28	30	32	34	35	37	38	41	45
High Temperature, y	49	50	57	54	60	58	64	66	63	72

(a) Enter data into lists on your calculator. And create a scatter plot using your graphing technology. Size the **WINDOW** appropriately so that the data takes up the majority of the screen. Compare this to the scatter plot you created in the last lesson.

(b) Use your calculator to find the equation for the line of best fit. Round the slope of the line to the nearest hundredth and the y-intercept to the nearest integer. Compare this to the slope you found in the last lesson.

Equation for Best Fit Line   Slope from Lesson #6

(c) Explain what the y-intercept of this model represents in terms of the low and high temperatures that are being modeled in this problem.

(d) How would you interpret the slope of this model in terms of how the low and high temperatures change with respect to each other?

***Exercise* #2:** Generally, the fuel efficiency of a car changes with the weight of the car. A survey of some cars with their weights and gas mileages is shown below.

Weight (1000's of lbs)	3.7	4.5	3.2	5.1	6.8	4.9	4.8	5.5
Mileage (miles per gallon)	38	26	48	24	18	30	28	21

(a) Find the equation for the line of best fit using your calculator. Round both coefficients to the nearest tenth. List what the variables x and y represent in this problem.

(b) Create a graph of the scatter plot for this data. Would you consider the **correlation** between weight and mileage to be **positive** or **negative?** Explain.

(c) Which **parameter** of the linear model predicts whether the **correlation** is positive or negative? Use this model to help explain your answer.

(d) If a car had a weight of 4,300 pounds, what would this model predict as its fuel efficiency? Round to the nearest integer. Use appropriate units and make sense of your answer.

(e) If we wanted to purchase a car that got 40 miles to a gallon, what weight of car, to the nearest 100 pounds, should we purchase? Solve algebraically.

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LINEAR REGRESSION ON THE CALCULATOR
COMMON CORE ALGEBRA I HOMEWORK

1. We are now going to revisit our data from the homework yesterday, but with our calculator. A survey was done at Ketcham High School to determine the effect of time spent on studying and grade point average. The table below shows the results for 10 students randomly selected.

Study time (Hours per week)	2	4	5	7	10	12	14	17	19	20
GPA (out of 100)	64	71	69	74	81	86	84	94	91	96

(a) Enter the data in your calculator and use it to generate the equation for the line of best fit. Round your slope to the nearest tenth and round your y-intercept to the nearest integer.

(b) According to the linear regression model from part (a), what GPA, to the nearest integer, would result from studying for 15 hours in a given week? Justify your answer.

(c) A passing average is defined as a 65% or above. Does the model predict a passing average if the student spends no time studying in a given week? Justify your answer.

(d) For each additional hour that a student studies per week, how many points does the model predict a GPA will rise? Explain how you arrived at your answer.

(e) Create a scatter plot of this data on your calculator. State the **WINDOW** that you used below. Compare this scatter plot to the one that you created by hand on the previous homework.

WINDOW: $x_{\min} =$ $x_{\max} =$ $y_{\min} =$ $y_{\max} =$

2. The mean annual temperature of a location generally depends on its elevation above sea level. A collection of nine locations in Nevada were chosen and had their elevation and mean annual temperature recorded. The data is shown below.

Elevation (feet)	1200	4125	6230	2378	5625	6328	4375	1864	3160
Mean Temperature ($°F$)	62	45	36	51	48	32	40	58	49

(a) Use your calculator to determine the equation for the line of best fit. Round your slope to the nearest *thousandth*. Note that it will be a small number. Round your *y*-intercept to the nearest integer.

(b) What does the *y*-intercept tell you about the temperature in Nevada?

(c) Using correct units, give an interpretation of the slope of this line.

(d) Using your model from part (a), what would be the predicted mean temperature at an elevation of 3000 feet above sea level?

(e) Would you characterize this correlation as being positive or negative? How can you tell this from the equation itself?

(f) Create a scatter plot of the data and graph the line of best fit on it as well. Are there any data points from the table above that are significantly "missed" by the model? If so, which data point?