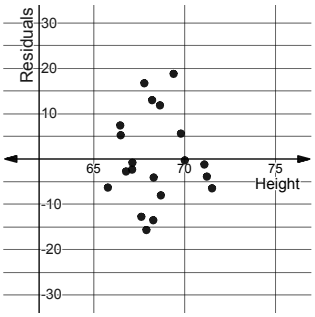
Name _____

HW L4-8

1. The heights and weights of a random sample of 20 individuals are recorded. The line of best fit describing the relationship between $x =$ height (in inches) and $y =$ weight (in pounds) is given by $\hat{y} = 4.128x - 152.234$. The residual plot for this linear regression model is shown. Is a linear model appropriate for this data? Justify your answer using the residual plot.



2. The table presents values for a function g at selected values of x.

x	-1	1	2	4	5
$g(x)$	2	9	20	125	300

a. Use a graphing calculator to find an exponential regression of the form $y = ab^x$ that can be used to model the data.

b. What is the value of $g(3)$ predicted by the exponential function model? Round to the nearest thousandth.

3. Jennie is a waitress at a local dinner. During one of her shifts, she records the total cost of the meal for each table she waits, and the amount she was tipped.

Meal Cost	$\$21.19$	$\$8.90$	$\$27.61$	$\$24.37$	$\$15.74$	$\$31.26$
Tip	$\$5.00$	$\$2.10$	$\$6.00$	$\$5.50$	$\$4.26$	$\$8.00$

a. Is the relationship between meal cost and tip best modeled by a linear function, a quadratic function, or an exponential function? Explain.

b. Use your graphing calculator to generate a regression equation that gives the predicted tip, $\hat{y}$, for a table that spends x dollars on their meal.

c. Use your equation to predict the tip Jennie can expect for a table whose total order costs $\$29$.

4. Certain countries experience rainy seasons and dry seasons. The amount of rainfall for one season can be modeled by the equation $\hat{y} = -0.015x^2 + 1.5x$ where y is the amount of daily rainfall, in inches, and x is the number of days into the rainy season.

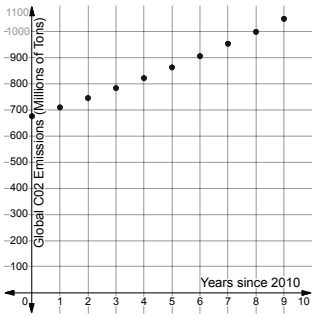
a. What is the predicted number of inches of rainfall 20 days into the rainy season?

b. Describe how the daily rainfall changes with respect to the number of days into the rainy season.

5. Data for the annual global CO_2 emissions from aviation, measured in millions of tons, is given in the table and shown in the graph.

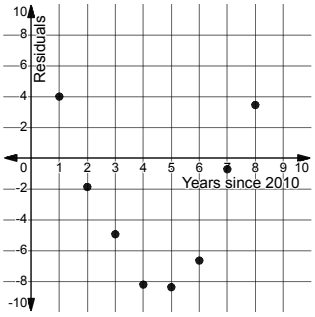
Year	2010	2011	2012	2013	2014	2015	2016	2017
Global CO_2 Emissions from Aviation (in millions of tons)	676.2	710	745.5	783.8	821.9	863.1	906.2	953.5

a. A linear model for the data is given by $\hat{y} = 41.3696x + 664.651$, where x is the number of years since 2010 and y is the global CO_2 emissions in millions of tons. How many millions of tons of global CO_2 does the model predict were emitted in 2015 ?



b. Calculate the residual for the year 2015 . What does this value represent?

c. A residual plot is shown for the linear model. Does a linear model seem to be appropriate for this data? Explain why or why not.



d. Describe how the global CO_2 emissions from aviation are changing over time.

e. What other model might be a better fit for this data? Explain.

6. The table presents values of a function f for selected values of x .

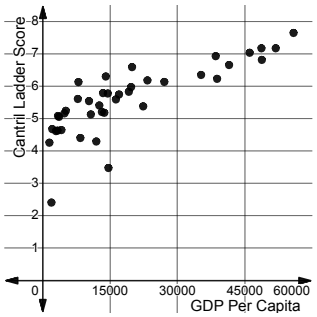
x	1	2	3	4	5	6	7
$f(x)$	7	8.5	10.8	14	18.7	24.1	30

a. Is f better modeled by a linear function or a quadratic function? Explain.

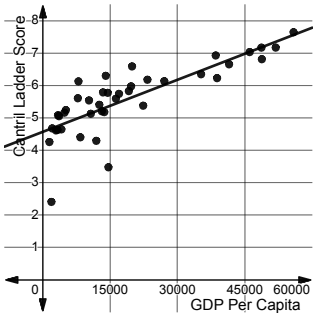
b. Use your graphing calculator to construct a regression model based on the function type you chose in part a. Write its equation.

c. Use your model in part b to approximate $f(4.5)$.

7. The Cantril Ladder is a $0-10$ scale used to rate life satisfaction. The scatterplot shows a country's national average Cantril Ladder score on the horizontal axis and the GDP per capita on the vertical axis.

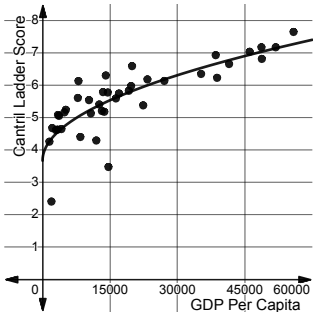


a. A linear regression model for this data is shown. What assumption is made about the relationship between the Cantril Ladder Score and GDP per capita in a linear model?



b. How well do you think a linear model "fits" this data?

c. A second model for this data is also shown. What assumption is made about the relationship between the Cantril Ladder Score and GDP per capita in this model?



d. Compared to the linear model, how well does the second model fit the data?