Linear Regression Definitions and Concepts

1. What is the range of possible numbers for a correlation coefficient?

   [-1, 1]

2. What is the range of possible numbers for the coefficient of determination?

   [0, 1]

3. If our correlation coefficient equals .78, what is our coefficient of determination? What if our correlation coefficient equals -.23?

   If r = .78, r^2 = 0.6084
   If r = -.23, r^2 = 0.0529

4. Describe in words what the slope says about the relation between our x and y variable.

   When our x variable increases by 1 unit, our y variable increases by the slope amount.

5. If our x variable represents people's heights and y is people's weights, and the smallest height in our data set in 58 inches and the largest height is 77 inches, why can't we use linear regression to predict the weight of a person who is 56 inches tall?

   If the smallest height is 58 inches and the largest height is 77 inches, then our linear regression model is only suitable to predict weights of people who have height between those values. 56in. is not between 58 inches and 77 inches.

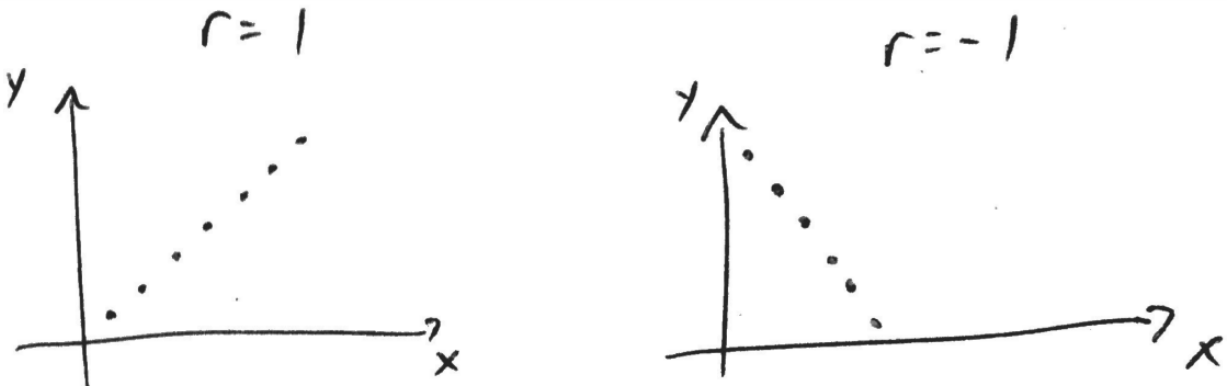
6. If our x variable represents number of wheels on an automobile and y is cost of tolls, why is the y-intercept in our least squares regression line not helpful to interpret?

   The interpretation of the y-intercept implies our x variable is zero. In this case, the y-intercept would be the lost of tolls for an automobile with zero wheels, which is not valid.

7. Provide in words the definition of R-squared.

   r-squared is the percentage of variation in the dependent variable that is predicted by the independent variable from a linear regression.

8. Draw two scatterplots, one for which r = 1 and a second for which r = -1.



9. What is wrong with the correlation r = 2.05?

   The range of numbers for a correlation coefficient is between -1 and 1.

   2.05 is not between those numbers.

10. For each of the following pairs of variables, indicate whether you would expect a positive correlation, a negative correlation, or a correlation close to 0. Explain your choice.
    a. Maximum daily temperature and cooling costs
       Positive
    b. Interest rate and number of loan applications
       Negative
    c. Height and IQ
       Correlation close to 0
    d. Height and shoe size
       Positive
    e. Time spent on homework and time spent watching television during the same day by an elementary school student
       Negative