Statistical Reasoning Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Guided Notes 4.2: Correlation Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Day \_\_\_\_

**Correlation**

The **correlation** describes the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of a straight-line (linear) relationship between two quantitative variables.

Correlation is usually written as ***r***, which we call the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Correlation is always between \_\_\_\_\_ and \_\_\_\_\_.

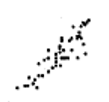
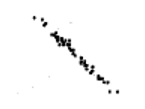
If r is positive that means there is a positive association

If r is negative that means there is a negative association

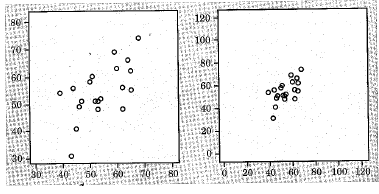
The closer r is to \_\_\_\_\_\_\_\_\_\_\_\_\_, the stronger the association and the closer to \_\_\_\_\_ the weaker

the association





Why do we need a correlation coefficient? Consider the following scatterplots.



**Understanding correlation:**

* Correlation does not change when we change units of measurement
* Correlation ignores distinction between response/explanatory variables
* Correlation ONLY measures the strength of straight line associations.
* Correlation is strongly affected by outliers (be careful!)

Example 1:

Find the correlation r between the variables.

Statistical Reasoning Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

WS 4.2: Correlation Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Day \_\_\_\_

1. A college student wonders if tall women tend to date taller men. She measures herself, her dorm roomates, and the women in the adjoining rooms; then she measures the next man each woman dates. Here is the data with height in inches.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Women(x) | 66 | 64 | 66 | 65 | 70 | 65 | 67 | 69 | 68 |
| Men(y) | 72 | 68 | 70 | 68 | 71 | 65 | 70 | 72 | 73 |

1. Make a scatterplot of the data.
2. Based on the scatterplot, do you expect the correlation to be positive or negative? Near +1 or -1?
3. Use your calculator to find the correlation coefficient r.
4. How would r change if all the men were 6 inches shorter.
5. Does the correlation tell us whether women tend to date men taller than themselves?
6. If heights were measured in centimeters rather than inches, how would the correlation change?
7. If every woman dated a man exactly 3 inches taller than herself, what would be the correlation between male and female heights?
8. List the correlation coefficients in order from weakest to strongest: 0.79, -0.43, -0.4, 0.82, 0.08
9. How would you describe a correlation coefficient = 0.87? What about -0.03?
10. Describe the correlation:
    1. Hours worked at a job and amount of money earned
    2. Age of students in the class and their height
    3. Age of a Honda Accord and its value over time
    4. Temperature and time a cup of coffee is left on the counter
    5. Math test score and height
    6. Amount of money in the bank and number of days since last paycheck
11. Match the graph with the r-value that best describes it.

***r = -0.9 r = -0.7 r = -0.3 r = 0 r = 0.3 r = 0.7 r = 0.9***

