

We will play with an applet located at

[http://bcs.whfreeman.com/ips4e/cat\\_010/applets/CorrelationRegression.html](http://bcs.whfreeman.com/ips4e/cat_010/applets/CorrelationRegression.html). This link is given under Assorted Handouts and Tutorials on your course's webpage on [www.stlmath.com](http://www.stlmath.com) so you can simply click on it. [But if you do opt to enter the address yourself, the "space" after cat about halfway through is actually an underscore ( \_ ).]

The applet gives you a blank scatter plot. You plot points by clicking on the graph. It calculates the straight-line correlation, or how well your points fit the pattern of a straight line.

Above the graph, it tells you how many points you have plotted and the correlation coefficient of these points. (You do not need to worry about the "sum of squares".)

Click on the trashcan to the right of the graph to erase your points. You can also click-and-drag a single point to the trashcan or to another spot on the graph.

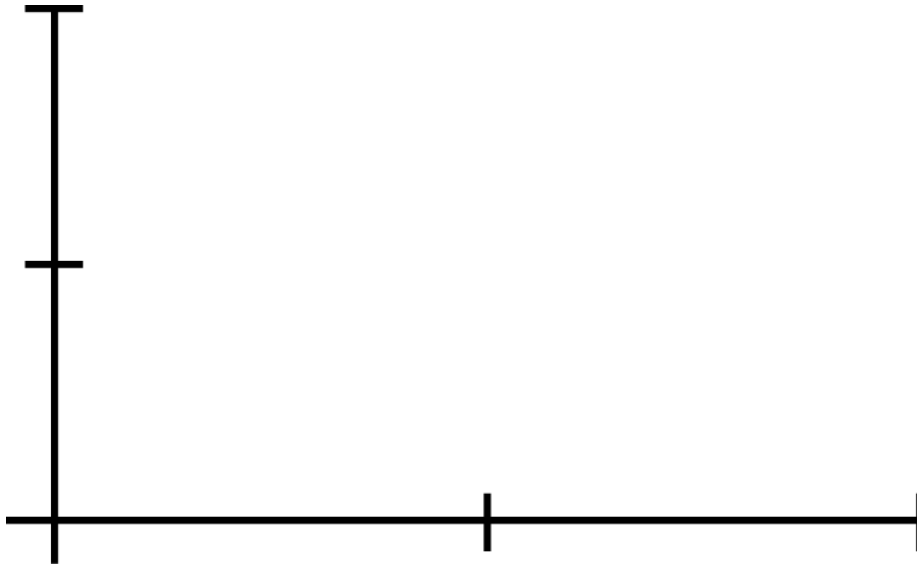
Make sure you have "Add data" bulleted beneath the graph.

**Correlation Coefficient: This value tells you how well the points fit on a straight line. We will investigate the values it takes and why. It is often denoted by  $r$ .**

1. Plot ten points that form a rough linear pattern that slopes **down** from left to right. They do **not** need to form a perfect line; in fact, it's best if they do not. Copy the graph below as best you can. What is the correlation coefficient? (Use  $r$  to denote the correlation coefficient.)



2. Erase the points from the previous question. Plot ten points that form a rough linear pattern that slopes **up** from left to right. They do **not** need to form a perfect line; in fact, it's best if they do not. Copy the graph below as best you can. What is the correlation coefficient?

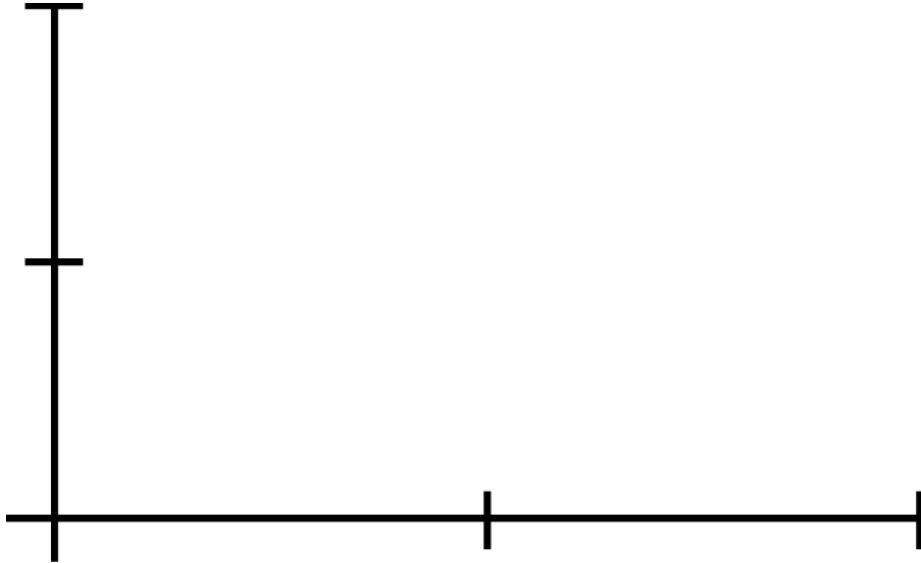


3. What is true of the correlation coefficient if the points slope **down** from left to right? You may need to plot several different sets of points to answer this question.

4. What is true of the correlation coefficient if the points slope **up** from left to right? You may need to plot several different sets of points to answer this question.

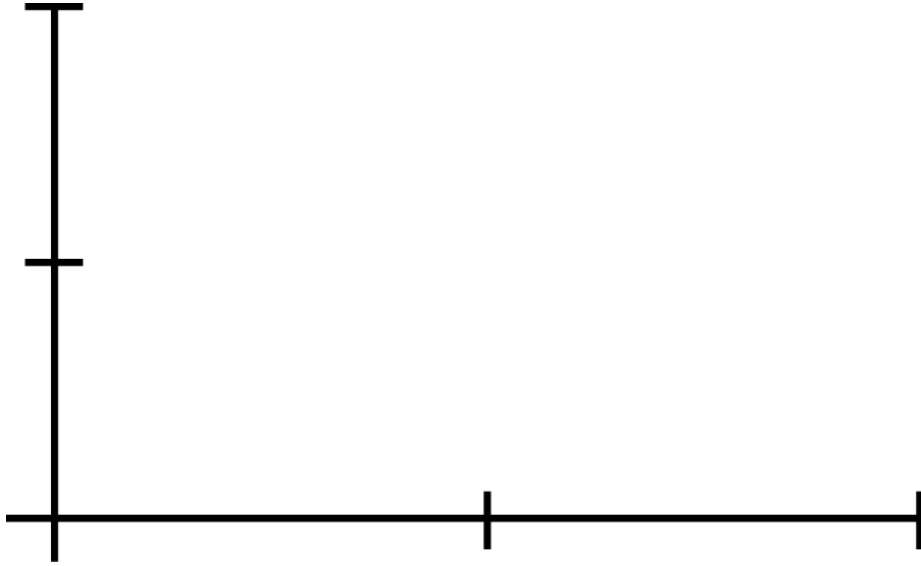
**Switch the person at the computer at this time!!!!!!!**

5. Erase the points from the previous question. Plot ten points that are scattered across the graph in no real pattern. Copy the graph below as best you can. What is the correlation coefficient?



We will now play with the “Least-Squares Line”. This is the straight line that best approximates the pattern of the points. It is also called the line of best fit or the regression line.

6. Erase the points from the previous question. Plot ten points that are in a rough linear pattern sloping **up** from left to right. Then click the “Show least-squares line” option below the graph. Notice the line mimics the pattern of the points. Copy your points and the line below. What is the correlation coefficient? (Do not erase your points. We’ll use the same graph in the next question.)



7. Now plot a few points in the lower right corner of the graph. What happens to your line? Why? Copy your points and the line below. What is the correlation coefficient?



**Switch the person at the computer at this time!!!!!!!**

8. Erase the points from the previous question. Plot ten points that form a rough linear pattern that slopes **up** from left to right. They do **not** need to form a perfect line; in fact, it's best if they do not. Copy your points and the regression line below. What is the correlation coefficient? (Do not erase your points. We'll use the same graph in the next question.)



You can click-and-drag a point to another spot on the graph, and the correlation coefficient changes as you move it.

9. Move your points individually to try to **increase** the value of the correlation coefficient. Experiment a bit with how moving your points changes the correlation coefficient. (You will notice that the regression line will move too as you move your points. That is to be expected. Think about why that is.) What do you need to do to the points to increase the correlation coefficient?

10. Erase the points from the previous question. We want to investigate the possible values of the correlation coefficient, often denoted by  $r$ .

a.) Plot ten or so points and try to get  $r$  as big as you can. What is your value of  $r$ ? Describe the pattern of points that yields the biggest  $r$ .

b.) Plot ten or so points and try to get  $r$  as small as you can. What is your value of  $r$ ? Describe the pattern of points that yields the smallest  $r$ . (HINT: This is similar to part  $a$ , but think negative!)

c.) Plot ten or so points and try to get  $r$  as close to zero as you can. What is your value of  $r$ ? Describe the pattern of points that yields  $r$  close to zero.