

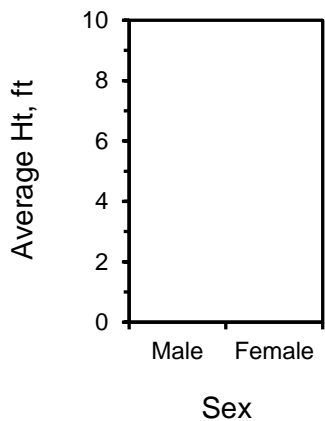
Human Anatomy & Physiology I

Lab 2 Graphing styles & interpreting graphs

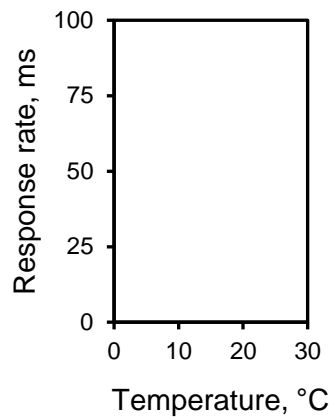
Lab exercises 2.1

For data that would be plotted in the following graphs, should you use a scatter plot or a bar graph?
Use the axis titles to determine what is being graphed

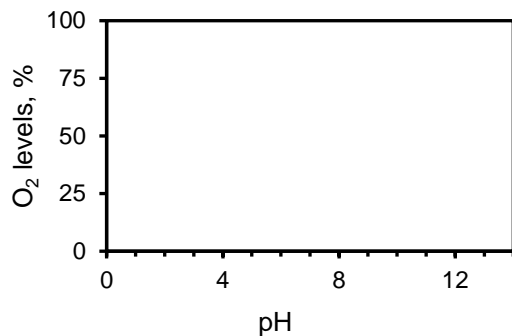
1. Scatter or bar? _____



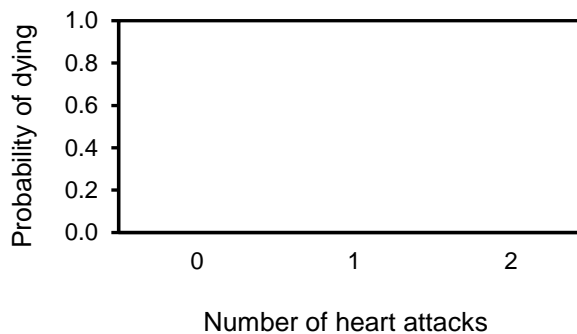
2. Scatter or bar? _____



3. Scatter or bar? _____



4. Scatter or bar? _____



Lab exercises 2.2

For each of the following data sets, which is the independent variable (X variable) and which is the dependent variable (Y variable)?

1. You are testing the toxicity of a new drug. You administer different doses to groups of mice and determine the percentage of the group that died as a result.

The two variables are:

- i) Percentage of dead mice _____ X axis or Y axis?
ii) Drug dosage _____ X axis or Y axis?

2. You are following the crime rate in Columbus over the past year. You are counting the number of crimes in each month.

The two variables are:

- i) Month _____ X axis or Y axis?
ii) Number of crimes _____ X axis or Y axis?

3. You take all the crimes in Columbus in the past year and classify them according to type (murder, robbery, assault, etc.)

The two variables are:

- i) Type of crime _____ X axis or Y axis?
ii) Number of that type of crime _____ X axis or Y axis?

4. You are comparing three different cold remedies. You have volunteers with colds take one of the remedies and you measure how much longer the cold lasts after taking the medicine.

The two variables are:

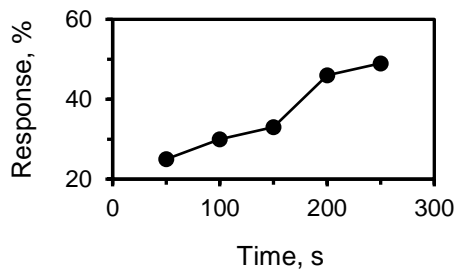
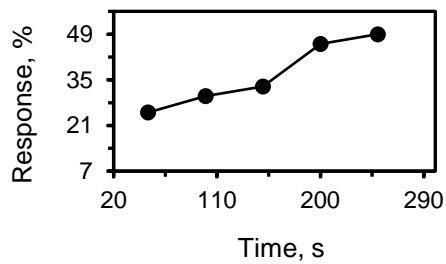
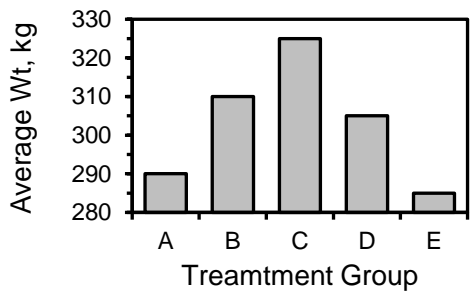
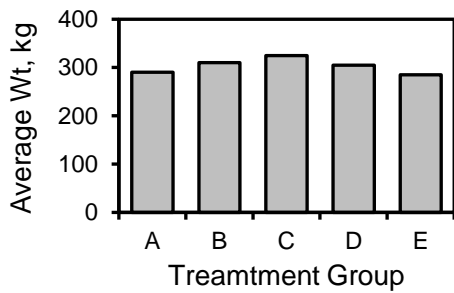
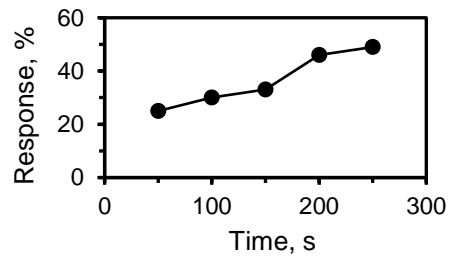
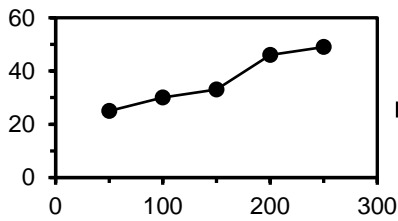
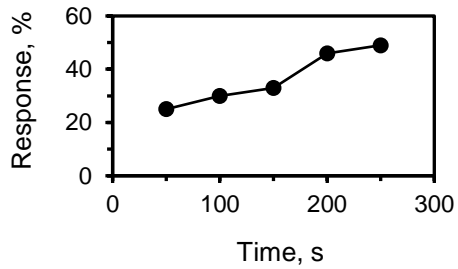
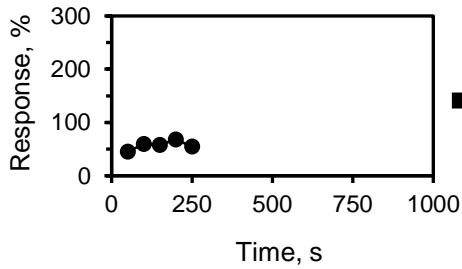
- i) How much longer the cold lasts _____ X axis or Y axis?
ii) Which cold remedy was used _____ X axis or Y axis?

Lab exercises 2.3

Use the following schematic instructions to write out nine rules for designing graphs.

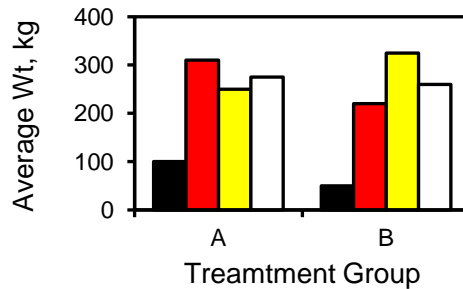
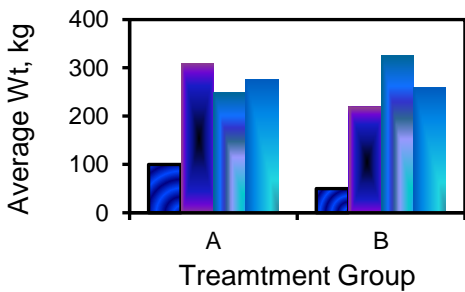
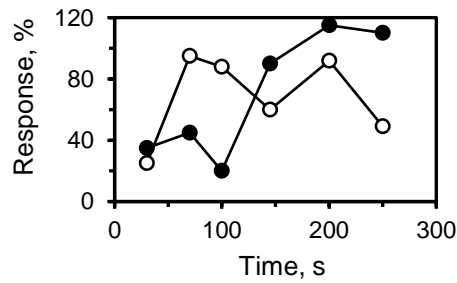
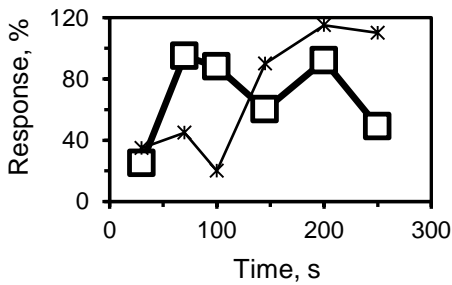
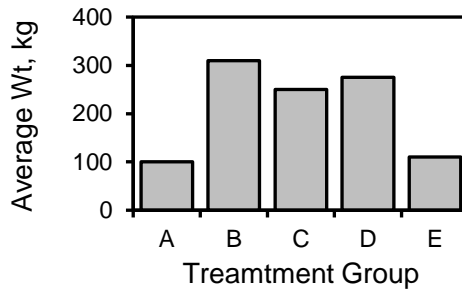
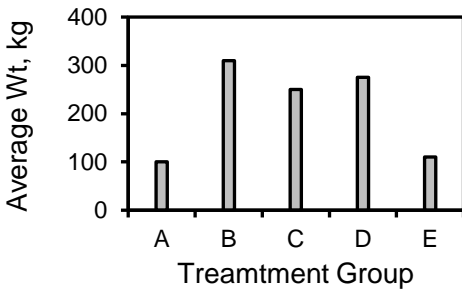
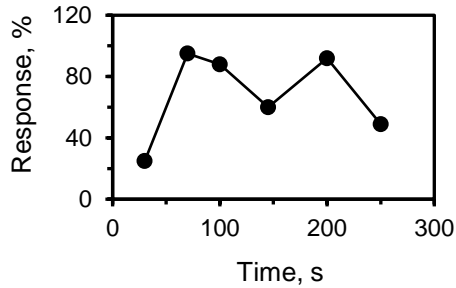
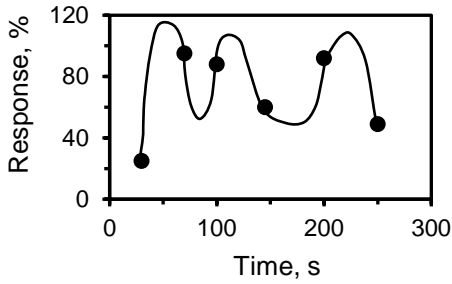
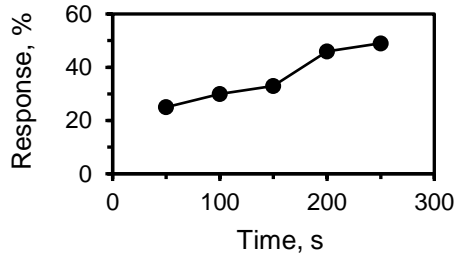
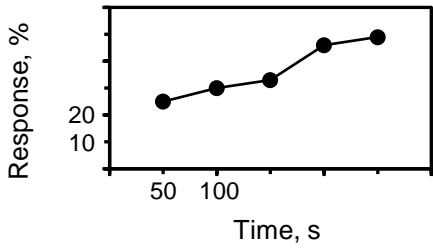
Schematic representation of rule

Rule demonstrated by example



Schematic representation of rule

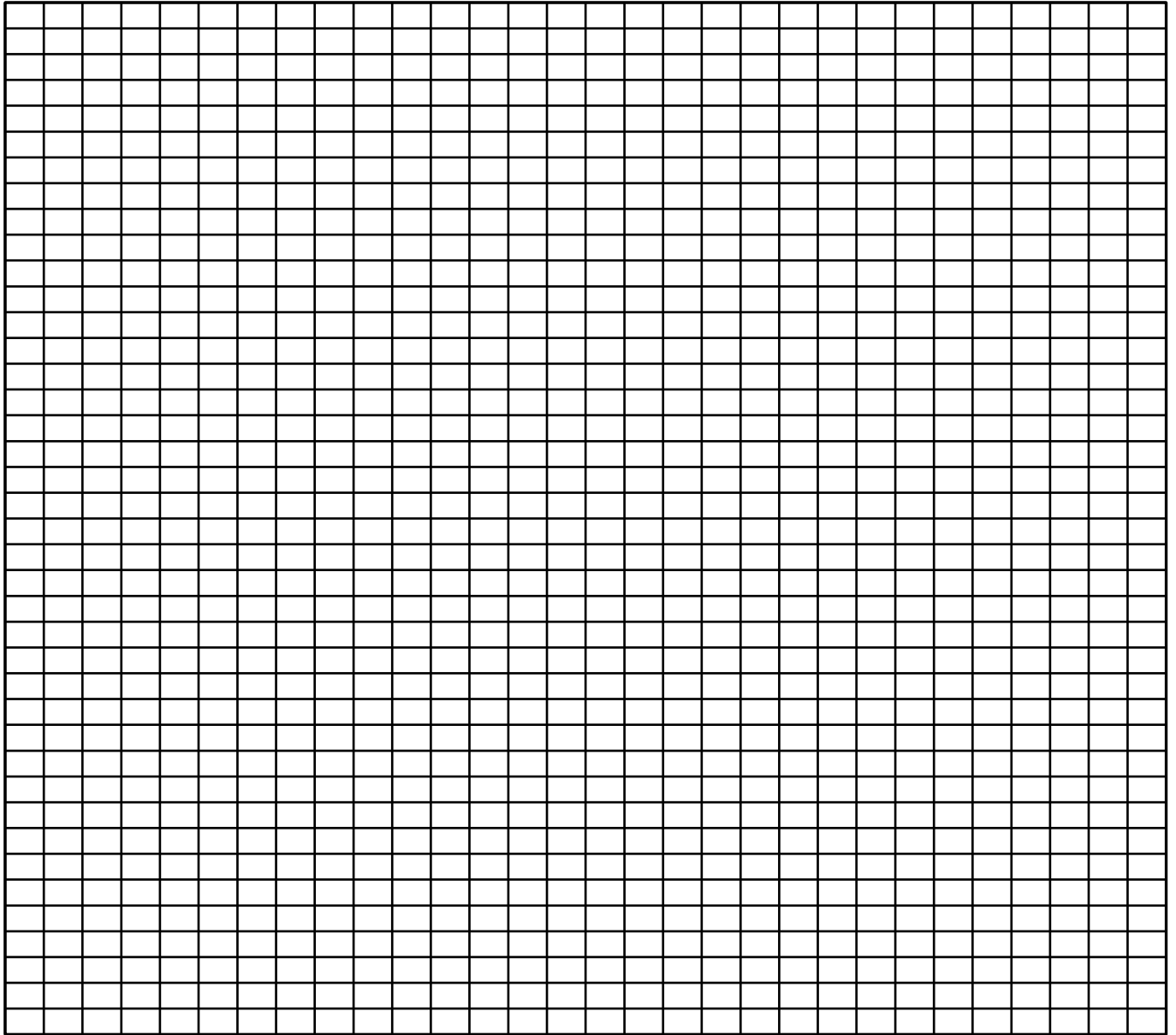
Rule demonstrated by example



Lab exercises 2.4

- i. Plot the data below in the grid of squares provided. You will have two data sets, one for men and one for women. Plot them both on the same axes.
- ii. Keep in mind the rules established in earlier exercises for deciding on whether it should be a scatter plot or bar graph, for determining which variable should be the X variable and which should be the Y variable, and for the features of a well-designed graph.
- iii. Design your graph so that you emphasize to the reader that you have concluded that for women smoking is correlated to increase incidences of lung cancer regardless of which country they come from, but that for men of different countries the relationship between smoking and incidences of lung cancer is more complex.
- iv. Here is the data. The grid where you will plot the data is on the next page.

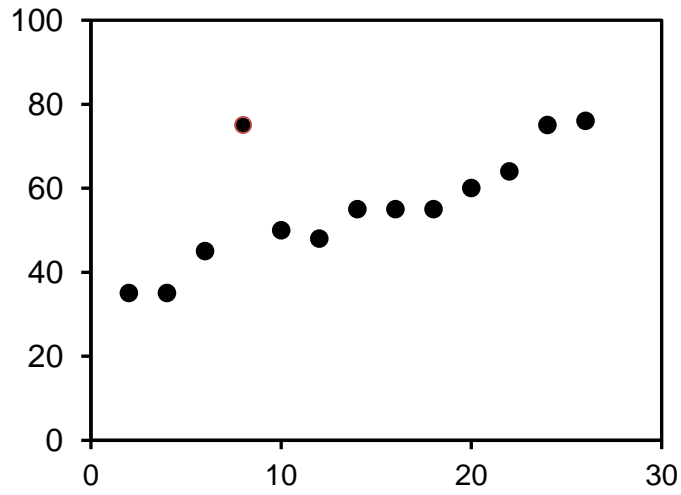
Country	Percentage of the population who smoke in Averages		Deaths from lung cancer/ deaths per 100,000	
	Males	Females	Males	females
China	53.4	4.0	22.7	10.5
France	33.0	21.0	73.3	14.4
Malaysia	49.2	3.5	5.6	2.3
New Zealand	25.1	24.8	47.3	29.2
South Africa	43.8	11.7	13.8	5.4
Trinidad & Tobago	42.1	8.0	12.3	4.2



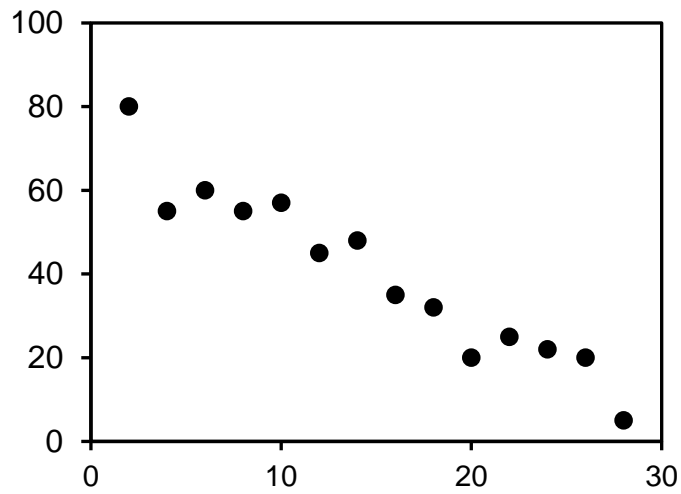
Lab exercises 2.4

Use the following guidelines to estimate the best-fitting straight line through the data in the three graphs below and then draw in the best-fitting straight line with a ruler. Next to each graph, indicate what kind of correlation, in general, you are looking at.

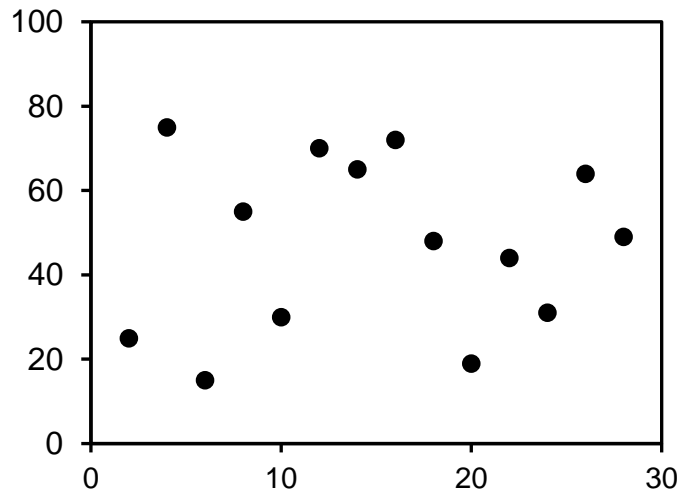
- The best-fitting straight line will have the maximal number of data points as close as possible to the line.
- If there are a few data points that are far away from the line, that is okay as long as most of the other data points are as close to the line as possible.
- Ideally there should be as many data points above the line as there are below it.
- It is better to have none of the data points actually on the line but most of them as close as possible than to have a few points on the line but the rest of the points farther away than they would be in the line were just moved a bit.
- Best-fitting lines do not have to go through (0,0) if the origin does not fit the rest of the data.



Type of correlation: _____



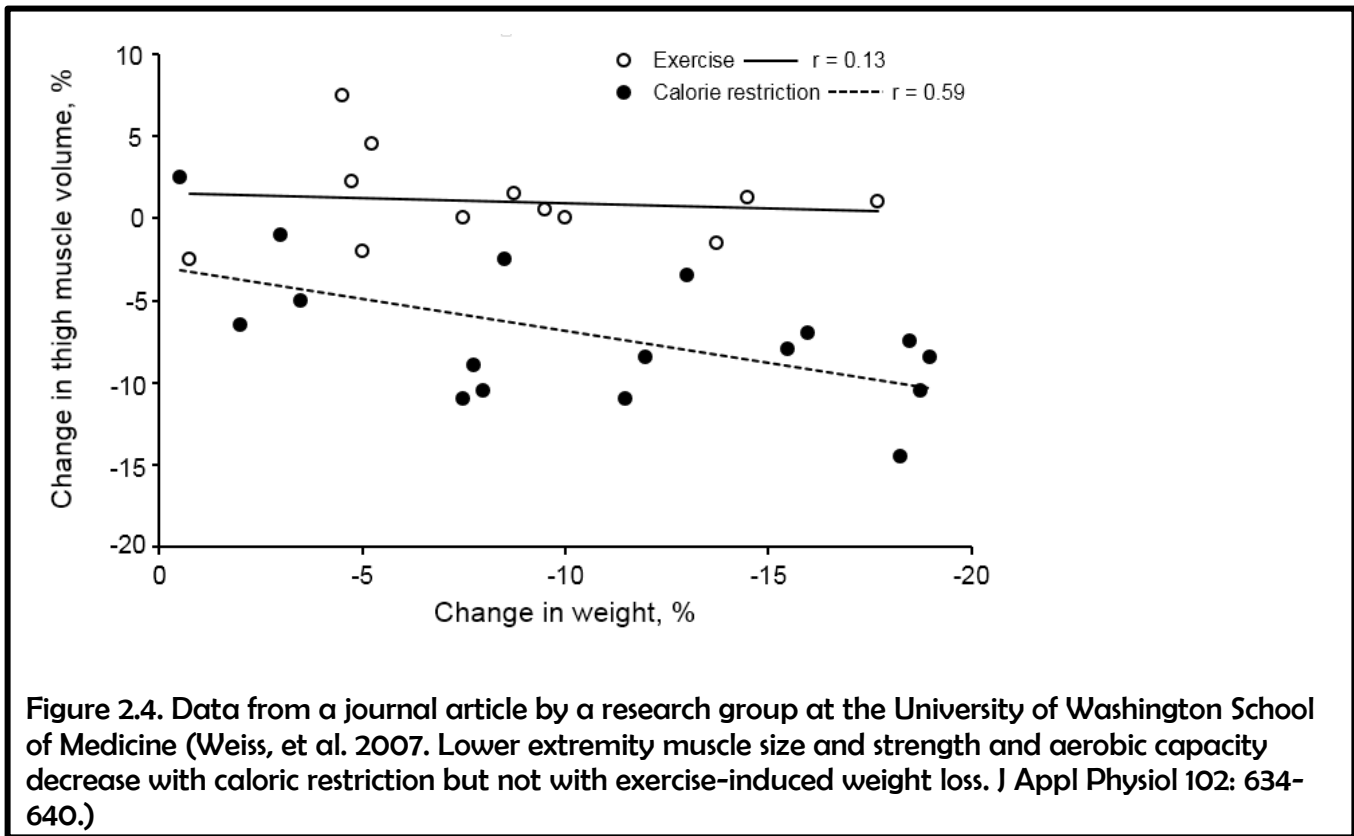
Type of correlation: _____



Type of correlation: _____

Lab exercises 2.5

Use the following graph as an example to walk through the steps of figuring out how to interpret a graph.



The researchers were comparing weight loss from dieting (“caloric restriction”) to weight loss from exercise. They had two groups, each consisting of 18 men and women in their fifties. The first group were called the caloric restriction group and were put on a strict diet for three months. The second group were called the exercise group and were put on an exercise regimen for three months. After the three months, the researchers measured various indicators of strength in their test subjects. This graph is the results of one of the researchers’ set of measurements.

- i. Examine the graph. What does each data point represent?
- ii. What is being measured on the X axis and what aspect of the study is it reporting?
- iii. What is being measured on the Y axis and how is it an indicator of strength?

- iv. Why are the researchers interested in the correlations between these two variables in both the exercise-only group and the diet-only group?

- v. The best-fit line through the exercise data (EX) has a value of $r^2 = 0.13$. What does tell you about the relationship between exercising-induced weight loss and the changes in the size of the subjects' thigh?

- vi. Why doesn't the best-fit line through the exercise data (EX) have a correlation coefficient of $r^2 = 0.0$?

- vii. The best-fit line through the dieting data (CR) has a negative slope and a correlation coefficient of $r^2 = 0.59$. What does this tell you about the relationship between dieting-induced weight loss and changes in the size of the subjects' thighs?

- viii. Why doesn't the best-fit line though the dieting data (CR) have a correlation coefficient of $r^2 = 1.0$?

- ix. This graph only tells us definitive information about how weight loss via exercise or dieting effect the size of the thigh muscles in these volunteers. But we can formulate more general hypotheses about the effect of dieting-induced weight loss vs. exercise-induced weight loss on overall strength based on these result. These more general hypotheses are not definitively supported yet, but they are suggested by these results. What are these more general hypotheses?