

1. The salaries of major league baseball players range from several hundred thousand dollars per year to many millions. Suppose a histogram is made of all last year's salaries of major league baseball players. Which shape would best describe the shape of this histogram?
 - a. Skewed to the right
 - b. Bimodal
 - c. Bell shaped
 - d. Skewed to the left

2. A set of midterm exam scores has a median that is much larger than the mean. Which of the following statements is most consistent with this information?
 - a. A stemplot of the data would be skewed left.
 - b. The data set must be so large that it would be better to draw a histogram rather than a stemplot.
 - c. A stemplot of the data would be symmetric.
 - d. A stemplot of the data would be skewed right.

3. Interest rates for home mortgages have, in general, declined during recent months. With the apparent favorable influence for new-home building, there seems to be clear relationship between X = the prevailing mortgage interest rates and Y = the number of new houses being built per month in a Midwestern city over a period of 18 months. A scatterplot of the data collected shows that the linear model is appropriate. The equation of the least-squares regression line is $\text{Number of new houses} = 672.89 - 30.65 \times \text{Interest rate}$ and $R^2 = 0.49$.
 - a. Which of the following descriptions below best represents the value of the slope?
 - i. We cannot interpret the slope because we cannot build a negative number of new houses.
 - ii. When the interest rate increases by 1%, the number of new houses being built is expected to drop by 30.65.
 - iii. When no new houses are being built, the interest rate equals 30.65%.
 - iv. When the number of new houses being built increases by 1, the interest rate is expected to drop by 0.3065.

 - b. Is the association between Interest rate and Number of new houses being built positive or negative?

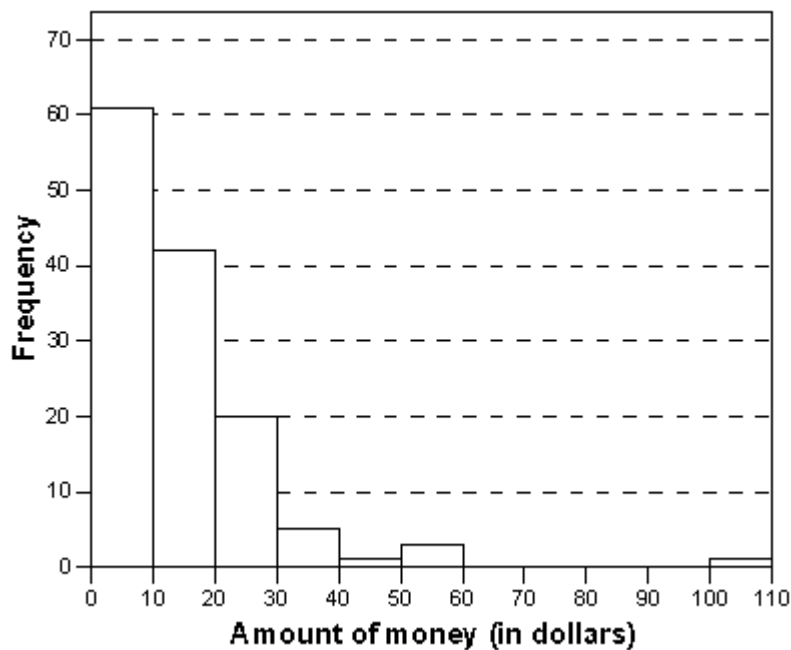
 - c. What is the most plausible explanation for the association between Interest rate and Number of new houses being built?

 - d. What is the correlation coefficient between Interest rate and Number of new houses being built?

- e. Predict the Number of new houses being built for a month when the Interest Rate is 10.2.
4. This is a standard deviation contest. Which of the following sets of four numbers has the largest possible standard deviation?
- 0, 1, 2, 3
 - 7, 8, 9, 10
 - 5, 5, 5, 5
 - 0, 0, 10, 10
5. Bob has a severe cold. His roommate takes a garlic tablet every morning and has not had a cold in two years. Bob's aunt also has a friend who takes garlic tablets daily and has not had a cold in more than a year. Based on these data, Bob decides to start taking garlic tablets as soon as his cold clears up. What type of study is Bob's decision based on?
- An observational study based on available data.
 - An experiment.
 - Anecdotal evidence.
 - An observational study based on a sample survey.
6. Many studies are trying to find a cure for chronic back pain. In one such study, a physician is comparing the medication currently being used (drug A) to a newly developed drug (drug B). Seventy-three volunteers, suffering from chronic back pain, are participating in this study. The physician's assistant has a list of all 73 subjects and randomly divides the subjects into two groups. Group 1 will receive drug A and group 2 will receive drug B. The assistant is the only one who knows to which group the subjects have been assigned. The physician monitors the subjects over a 2 month period and the amount of improvement is recorded. What type of study is this?
- A double-blind experiment.
 - A matched-pairs experiment.
 - An experiment, but not a double-blind experiment.
 - An observational study.
7. When possible, what is the best way to establish that an observed association is the result of a cause-and-effect relation?
- Obtain the correlation coefficient.
 - Use a well-designed experiment.
 - Examine z -scores rather than the original variables.
 - Study the least-squares regression line.

8. In order to determine if smoking causes cancer, researchers surveyed a large sample of adults. For each adult they recorded whether the person had smoked regularly at any period in their life and whether the person had cancer. They then compared the proportion of cancer cases in those who had smoked regularly at some time in their lives with the proportion of cases in those who had never smoked regularly at any point in their lives. The researchers found that there was a higher proportion of cancer cases among those who had smoked regularly than among those who had never smoked regularly. What type of study is this?
- An experiment, but not a double-blind experiment.
 - A double-blind experiment.
 - A block design.
 - An observational study.
9. Olivia is planning to take a foreign language class. To research how satisfied other students are with their foreign language classes, she decides to take a sample of 20 such students. The university offers classes in four languages: Spanish, German, French, and Japanese. She will select a simple random sample of five students from each language.
- Olivia asks the instructors of the 20 selected students to have the students rate the class they are currently enrolled in. If Olivia plans to use these ratings to learn about how satisfied all foreign language students are, why will the results be questionable?
 - Because of response bias.
 - Because she used voluntary response.
 - Because she used a poorly worded question.
 - Because of nonresponse bias.
 - What sampling technique is Olivia using?
 - A stratified sample.
 - A multistage sample.
 - A simple random sample.
 - None of the above.
10. Battery packs in electric go-carts need to be able to last a fairly long time. The run-times (time until it needs to be recharged) of the battery packs made by a particular company are normally distributed with a mean of 2 hours and a standard deviation of 20 minutes.
- What is the third quartile for the run-time distribution?
 - Battery packs that have a run-time in the highest 10% of the run-time distribution are highly sought after by go-cart drivers. How long does the battery pack have to last for it to fall in this highly sought-after class?
 - What percentage of these battery packs lasts longer than 3 hours?

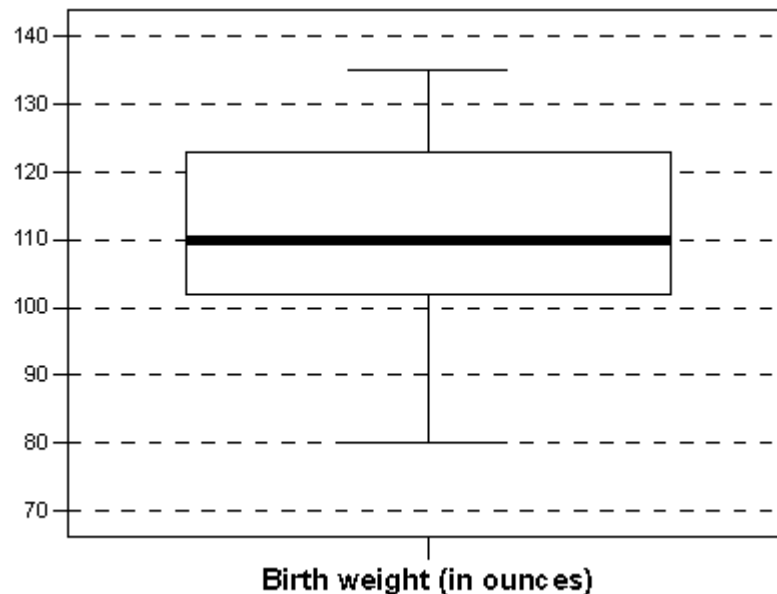
11. In a statistics class with 136 students, the professor records how much money each student has in their possession during the first class of the semester. The histogram shown below represents the data he collected.



- a. From the histogram, which of the following is true?
- It is impossible to compare the mean and median for these data.
 - The mean is larger than the median.
 - The mean is smaller than the median.
 - The mean and median are approximately equal.
- b. What is the range of the data set?
- 100
 - 110
 - This cannot be determined from just the histogram.
 - 90
12. One hundred volunteers who suffer from severe depression are available for a study. Fifty are selected at random and are given a new drug that is thought to be particularly effective in treating severe depression. The other 50 are given an existing drug for treating severe depression. A psychiatrist evaluates the symptoms of all volunteers after four weeks in order to determine if there has been substantial improvement in the severity of the depression.
- a. What is the explanatory variable or factor in this study?
- The use of a psychiatrist to evaluate the severity of depression.
 - The extent to which the depression was reduced.
 - Which drug the volunteers receive.
 - The use of randomization and the fact that this was a comparative study.

- b. Suppose volunteers were first divided by gender, and then half of the men were randomly assigned to the new drug and half of the women were assigned to the new drug. The remaining volunteers received the other drug. What is this an example of?
- Confounding. The effects of gender will be mixed up with the effects of the drugs.
 - A block design.
 - A matched-pairs design.
 - Replication.
- c. In which situation would this study be double-blind?
- Neither the volunteers nor the psychiatrist knew which treatment any person had received.
 - Neither drug had any identifying marks on it.
 - All volunteers were not allowed to see the psychiatrist nor was the psychiatrist allowed to see the volunteers during the session when the psychiatrist evaluated the severity of the depression.
 - All of the above.

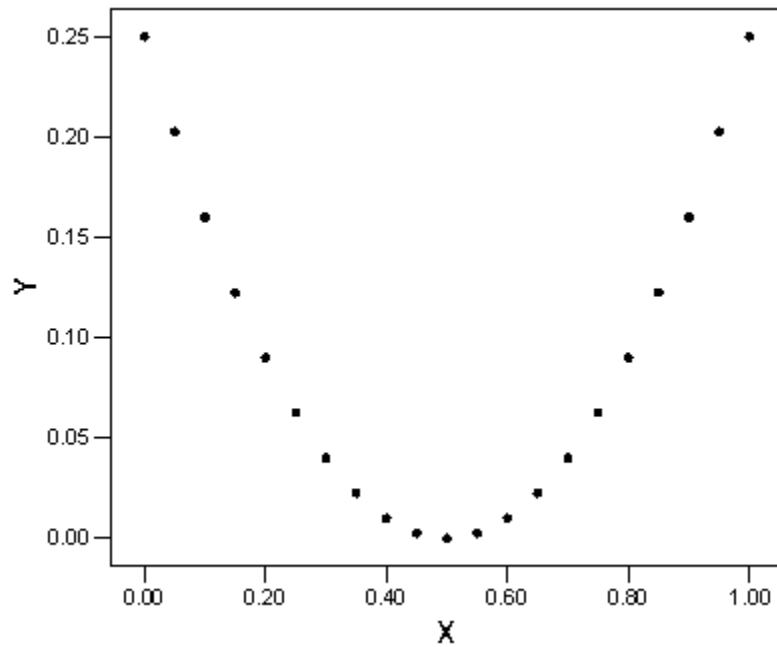
13. The following boxplot is of the birth weights (in ounces) of a sample of 160 infants born in



a local hospital.

- Fill in the blank. Approximately _____ children had birth weights between 102 and 122 ounces.
- Fill in the blank. The median birth weight is approximately _____
- Fill in the blank. About 40 of the birth weights were below _____

14. Consider the following scatterplot of two variables X and Y .



What can we conclude from this graph?

- The correlation between X and Y is close to 0.
- The correlation between X and Y must be close to 1 because there is nearly a perfect relationship between them.
- The correlation between X and Y could be any number between -1 and $+1$. Without knowing the actual values, we can say nothing more.
- The correlation between X and Y must be close to -1 because there is nearly a perfect relationship between them, but it is not a straight-line relation.