

## Midterm Prep

### FREE RESPONSE QUESTIONS

1. Your book lists three major reasons that studies are conducted. Name one of them.
2. How can a researcher try to address the problem of confounding variables when designing an observational study?
3. What is the main purpose of using a random sample in a study?
4. What is the main purpose of using random assignment in experiments?
5. Name the four kinds of useful information that you can get about a set of measurement data once it has been organized and summarized.
6. Nature provides numerous examples of populations of measurements that, at least approximately, follow a normal curve. Give one example.
7. The Empirical Rule says that for a normal curve, approximately 68% of the values fall within 1 standard deviation of the mean in either direction, while 95% of the values fall within 2 standard deviations of the mean in either direction. Explain why you don't have twice as many values within 2 standard deviations as you do within 1 standard deviation.
8. Name three basic characteristics that a good plot, graph, or picture of data should exhibit.
9. Give an example where the response variable is causing a change in the explanatory variable.

### MULTIPLE-CHOICE QUESTIONS

10. Which of the following is a potential complication of observational studies?
  - a. Confounding variables
  - b. The improper conclusion of causation
  - c. Improper extension of the results
  - d. All of the above
11. If you used a 12-inch ruler to measure the distance across a large pond, which of the following aspects of a good measurement would you be violating?
  - a. Validity
  - b. Reliability
  - c. Unbiasedness
  - d. None of the above.
12. Without random sampling, which of the following can happen?
  - a. Naturally occurring confounding variables can result in an apparent relationship between the explanatory and response variables.
  - b. The results may not be able to be extended to a larger population.
  - c. The researchers will have a much easier time getting participants for their study, resulting in a larger sample size, and more accurate data.
  - d. None of the above

13. Which of the following measures of center is affected by an outlier?
- Mean
  - Median
  - Mode
  - All of the above
14. Which of the following statements is true?
- If a data set is skewed to the right, that means there is bias in the results; the data are higher than they should be.
  - If a data set is skewed to the right, then the higher values are more spread out than the lower values.
  - If a data set is skewed to the right, then the lower values are more spread out than the higher values.
  - None of the above.
15. Which of the following describes measurements that have a normal distribution?
- The majority of the measurements are somewhere close to the average.
  - The farther away you move from the average, the fewer individuals will have those more extreme values for their measurements.
  - The mean of the measurements is located in the middle of the bell-shaped curve.
  - All of the above.
16. Suppose the correlation between two measurement variables is  $-1$ . Which of the following statements is not true?
- As one of the variables increases, the other decreases.
  - The data looks the same as when two variables have a deterministic linear relationship.
  - The correlation between the variables is very weak.
  - All of the above statements are true.
17. In which case(s) should you be suspicious of a correlation that is presented?
- When the data is likely to contain outliers.
  - When the sample size is small.
  - When removing one point in the data set actually reverses the direction of the trend.
  - All of the above
18. Suppose you hear a report that says the chances of developing lung cancer increase by 10 times, just by living in the city versus the country. How do you interpret this?
- You had better move to the country; 10 times is a huge difference.
  - You need to find out what the baseline risk is and what confounding variables were adjusted for before you can determine how serious this is for you.
  - You should just stay put; no one could possibly come up with a valid statistic that measures this.
  - You should ignore the results. Your increased risk should depend on whether or not your house contains radon gas, not on whether the house is in the city or the country.