

## Midterm Prep Solutions

### FREE RESPONSE QUESTIONS

1. Your book lists three major reasons that studies are conducted. Name one of them.  
**ANSWER: ANY OF THE FOLLOWING IS ACCEPTABLE: 1) TO COLLECT DATA IN ORDER TO MAKE A DECISION; 2) TO ASK AND ANSWER QUESTIONS ABOUT THE WORLD AROUND US; OR 3) TO CONVINCING CONSUMERS THAT A CERTAIN PROGRAM OR PRODUCT WORKS BETTER THAN THE COMPETITION.**
2. How can a researcher try to address the problem of confounding variables when designing an observational study?  
**ANSWER: MEASURE ALL THE POTENTIAL CONFOUNDING VARIABLES HE/SHE CAN THINK OF AND INCLUDE THEM IN THE ANALYSIS TO SEE WHETHER THEY ARE RELATED TO THE RESPONSE VARIABLE; OR USE A CASE-CONTROL STUDY AND CHOOSE THE CONTROLS TO BE AS SIMILAR AS POSSIBLE TO THE CASES.**
3. What is the main purpose of using a random sample in a study?  
**ANSWER: SO THAT THE RESULTS CAN BE EXTENDED TO THE POPULATION FROM WHICH THE SAMPLE WAS DRAWN.**
4. What is the main purpose of using random assignment in experiments?  
**ANSWER: TO EVEN OUT CONFOUNDING VARIABLES ACROSS TREATMENTS AND OPEN UP THE POSSIBILITY FOR A CAUSE AND EFFECT CONCLUSION.**
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.  
**ANSWER: 1) THE CENTER; 2) THE VARIABILITY; 3) THE SHAPE; AND 4) UNUSUAL VALUES (OUTLIERS).**
6. Nature provides numerous examples of populations of measurements that, at least approximately, follow a normal curve. Give one example.  
**ANSWER: ANY REASONABLE ANSWER OK. EXAMPLES: IQ, STANDARDIZED TEST SCORES, PHYSICAL MEASUREMENTS WITHIN A HOMOGENEOUS POPULATION.**
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.  
**ANSWER: BECAUSE OF THE NORMAL, OR BELL-SHAPED CURVE. THE MAJORITY (68%) FALL CLOSE TO THE MEAN, WHERE THE "BELL" PART OF THE CURVE IS. AS YOU MOVE AWAY, YOU GET INTO THE TAILS OF THE CURVE, WHICH CONTAIN LESS AREA.**
8. Name three basic characteristics that a good plot, graph, or picture of data should exhibit.  
**ANSWER: ANY 3 OF THE FOLLOWING: 1) DATA SHOULD STAND OUT CLEARLY; 2) LABELING SHOULD BE COMPREHENSIVE AND CLEAR; 3) A SOURCE SHOULD BE GIVEN FOR THE DATA; AND 4) AS LITTLE "CHART JUNK" AS POSSIBLE.**
9. Give an example where the response variable is causing a change in the explanatory variable.  
**ANSWER: ANY SIMILAR EXAMPLE TO THE FOLLOWING IS OK: LOW OCCUPANCY RATES IN HOTELS CAUSE HIGHER ADVERTISING REVENUES (RATHER THAN THE OTHER WAY AROUND).**

## 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

**ANSWER: D**

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.

**ANSWER: B**

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

**ANSWER: B**

13. Which of the following measures of center is affected by an outlier?

- a. Mean
- b. Median
- c. Mode
- d. All of the above

**ANSWER: A**

14. Which of the following statements is true?

- a. 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.
- b. If a data set is skewed to the right, then the higher values are more spread out than the lower values.
- c. If a data set is skewed to the right, then the lower values are more spread out than the higher values.
- d. None of the above.

**ANSWER: B**

15. Which of the following describes measurements that have a normal distribution?

- a. The majority of the measurements are somewhere close to the average.
- b. The farther away you move from the average, the fewer individuals will have those more extreme values for their measurements.
- c. The mean of the measurements is located in the middle of the bell-shaped curve.
- d. All of the above.

**ANSWER: D**

16. Suppose the correlation between two measurement variables is  $-1$ . Which of the following statements is not true?

- a. As one of the variables increases, the other decreases.

- b. The data looks the same as when two variables have a deterministic linear relationship.
- c. The correlation between the variables is very weak.
- d. All of the above statements are true.

**ANSWER: C**

17. In which case(s) should you be suspicious of a correlation that is presented?
- a. When the data is likely to contain outliers.
  - b. When the sample size is small.
  - c. When removing one point in the data set actually reverses the direction of the trend.
  - d. All of the above

**ANSWER: D**

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?
- a. You had better move to the country; 10 times is a huge difference.
  - b. 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.
  - c. You should just stay put; no one could possibly come up with a valid statistic that measures this.
  - d. 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.

**ANSWER: B**