Quiz CHAPTER 4 Name:

1. What is the most important advantage of using a randomized experiment vs. an observational study, in terms of the statistical results?
   ANSWER: RANDOMIZED EXPERIMENTS, UNLIKE OBSERVATIONAL STUDIES, OFTEN ALLOW US TO DETERMINE CAUSE AND EFFECT. IN OBSERVATIONAL STUDIES, YOU CANNOT ASSUME THAT THE EXPLANATORY VARIABLE OF INTEREST IS THE ONLY ONE THAT MAY BE RESPONSIBLE FOR ANY OBSERVED DIFFERENCES IN THE OUTCOME VARIABLE.

2. Which of the following is a research strategy that involves the researcher manipulating the participants’ environment in some way?
   a. Sample survey
   b. Randomized experiment
   c. Observational study
   d. None of the above
   ANSWER: B

3. When you read the results of a scientific study, which of the following should you do first?
   a. Determine which type of research strategy was used (observational study, randomized experiment, etc.)
   b. Look at the results and decide whether they make sense or not.
   c. Jump to the part where they show the data, and see if was collected properly.
   d. Decide if the results apply to your life.
   ANSWER: A

4. In an experiment, you measure the result of the feature being manipulated, called the __________ variable, on an outcome, called the __________ variable.
   ANSWERS (RESPECTIVELY): EXPLANATORY; OUTCOME (OR RESPONSE)

Narrative: Boat show
The annual Vacation & Boat Show in Columbus, Ohio offers four types of attractions: boats, fishing gear, outdoor equipment, and vacation planning services. Tickets sell for $6 per person, and children under 5 get in free. This year the show organizers want to find out which attraction was most popular, so they surveyed 100 people at random who attended the show, and asked them. The results showed that 67% of them liked the boats best.

5. {Boat show narrative} Specify who/what the units are in this study.
   ANSWER: THE UNITS ARE THE BOAT SHOW PARTICIPANTS.

6. {Boat show narrative} Specify the population.
   ANSWER: ALL OF THE PEOPLE WHO ATTENDED THE VACATION AND BOAT SHOW IN COLUMBUS, OHIO THIS YEAR.

7. {Boat show narrative} Specify the sample.
   ANSWER: THE 100 BOAT AND VACATION SHOW PARTICIPANTS WHO WERE RANDOMLY SELECTED TO PARTICIPATE IN THE SURVEY.
8. What type of study takes place when the sample is equal to the population?
   a. A large-scale survey
   b. A census
   c. A nonrandom sample
   d. There is no such study. The sample can never be equal to the population.
   **ANSWER:** **B**

9. What does the word ‘unit’ mean, in statistical terms?
   a. The unit of measurement that is used (for example feet, inches, etc.)
   b. The people doing the sampling are called the sampling unit.
   c. A single individual or object to be measured.
   d. None of the above.
   **ANSWER:** **C**

10. Give three major advantages to using a (well designed and conducted) sample survey rather than a census.
    **ANSWER:** 1) CHEAPER; 2) FASTER; 3) ALMOST AS ACCURATE.

11. With a random sample of 2,500 people, we usually get an estimate that is accurate to within what percent of the truth (using the general rule)?
    **ANSWER:** 2%

12. Suppose a recent election exit pollster reports that “Forty-eight percent of the voters polled said they voted for Candidate A. The margin of error for this survey is plus or minus 2.5 percentage points.” Assume the exit poll was designed and conducted correctly. What percentage of all voters do you expect to vote for Candidate A? Give the most complete answer you can.
    **ANSWER:** between 45.5% and 50.5%

13. What is the margin of error?
    a. The amount of error allowable during the implementation of a survey.
    b. The amount of bias you can expect in the survey results.
    c. A measure of the accuracy of survey results.
    d. None of the above
    **ANSWER:** **C**

Narrative: Exit poll
Suppose a recent election exit pollster reports that “Forty-eight percent of the voters polled said they voted for Candidate A. The margin of error for this survey is plus or minus 2.5 percentage points.” Assume the exit poll was designed and conducted correctly.

14. {Exit poll narrative} What can be concluded about Candidate A?
    a. 48% of all voters will vote for Candidate A.
    b. We are confident that between 45.5% and 50.5% of all voters will vote for Candidate A. This means he/she will win the election, because 50.5% is more than half of the votes.
    c. We are confident that between 45.5% and 50.5% of the voters will vote for Candidate A. The election is ‘too close to call’ at this point. It could go either way.
    d. None of the above
    **ANSWER:** **C**

15. {Exit poll narrative} About how many people were sampled?
    a. 40
    b. 1,600
    c. 16,000
    d. Not enough information to tell.
    **ANSWER:** **B**
16. Suppose a random sample of people from your city found that 20% of the respondents own a cell phone, and the margin of error was 3%. In other words, you are confident that between 17% and 23% of all the people in your city own cell phones, based on this study. Suppose also that 1,000,000 people live in your city. Does this mean then that 200,000 people most likely own cell phones, plus or minus 30,000; or in other words, that between 170,000 and 230,000 people most likely own cell phones? (This was found by taking the results in percentage form and multiplying by the population size.)

   a. Yes. The math shows that.
   b. No. The margin of error in the latter case should be larger because you are dealing with the total number of people, not the percentage of people.
   c. No. The margin of error in the latter case should be smaller because you are dealing with the total number of people, not the percentage of people.
   d. None of the above.

   ANSWER:  A

17. The __________ can be applied to any percent reported regarding the sample to find an estimate of the percent of the population that would respond in the same way.

   ANSWER: MARGIN OF ERROR

18. As the number of units in the sample increases, the margin of error __________.

   ANSWER: DECREASES

19. What two things do you need in order to produce a simple random sample from the population?

   ANSWER: 1) A LIST OF THE UNITS IN THE POPULATION (SAMPLING FRAME); 2) A SOURCE OF RANDOM NUMBERS.

20. Suppose you have a herd of 100 cows and you need to select a simple random sample of 5 cows to test for a certain disease. You call the cows in for the evening, and pick the 5 that arrive first. Is this a simple random sample? Why or why not?

   ANSWER: NO. THERE IS BIAS TOWARDS ANIMALS THAT ARE POSSIBLY HEALTHIER, MORE AGILE, OR YOUNGER, ETC; NOT EVERY SUBSET OF 5 ANIMALS HAD AN EQUAL CHANCE OF BEING THE CHOSEN SAMPLE.

21. Which is better, a survey of 50,000 people who participated on an Internet web site, or a survey of 5,000 people where a computer was used to randomly choose the survey participants?

   ANSWER: THE SAMPLE OF 5,000. THIS IS A SIMPLE RANDOM SAMPLE. THE INTERNET SURVEY REPRESENTS A CONVENIENCE SAMPLE, WHICH IS BIASED.

22. You have 15 employees working for you: Bob, Sue, Jim, Alex, DJ, Ann, Leslie, Eric, Deb, Tom, Clint, Richard, Tami, Ellen, and Katie. Use the following set of random numbers (generated from the computer program called Minitab) to take a simple random sample of 3 employees to serve on the donut committee: 14531401146111619116112912015. Which employees got chosen for the donut committee? (Keep the employees in the order given when you assign numbers to them and do not start numbering with 0, start with 1.)

   a. Ellen, Tami, Bob
   b. Ellen, Tami, Ellen
   c. Bob, Alex, DJ
   d. None of the above

   ANSWER:  A
23. Assume you have a sampling frame of your entire population of interest, which is comprised of 100 people’s names. Which of the following sources could not be used to select a truly simple random sample of 10 people from this population?
   a. Assign each person a number from 001 to 100 and choose 10 numbers using a random number table.
   b. Put each of the 100 names on equal sized pieces of paper, put the names in a hat, mix thoroughly, and draw out 10 names.
   c. Put the names in alphabetical order and take the first 10 names on the list.
   d. Each of the above methods would yield a truly simple random sample.
   **ANSWER:** C

24. Why might a researcher choose to conduct a stratified random sample over a simple random sample? Give two reasons.
   **ANSWER:** ANY TWO OF THE FOLLOWING: 1) YOU CAN FIND (AND COMPARE) INDIVIDUAL ESTIMATES FOR EACH GROUP; 2) IF THE VARIABLE MEASURED GIVES MORE CONSISTENT VALUES WITHIN EACH GROUP, THE RESULTS ARE MORE ACCURATE; 3) MAY BE CHEAPER, IF STRATA ARE GEOGRAPHICALLY SEPARATED; 4) YOU COULD USE DIFFERENT INTERVIEWERS FOR EACH OF THE STRATA.

25. What is one advantage of a cluster sample over a simple random sample?
   **ANSWER:** ANY OF THE FOLLOWING IS ACCEPTABLE: 1) YOU DON’T NEED A LIST OF ALL THE INDIVIDUAL UNITS, JUST A LIST OF THE CLUSTERS; 2) IT CAN BE MUCH MORE CONVENIENT YET STILL ACCURATE; 3) IT CAN BE MUCH CHEAPER.

Narrative: Apartment complex
Suppose you want to survey the opinions of the residents of an apartment complex. The complex contains 100 buildings, each with 8 units per building, for a total of 800 units. You decide to sample 160 of the units.

26. {Apartment complex narrative} Suppose you randomly sample 20 buildings, and then select every unit in those 20 buildings to be in your sample, for a total of 160 units. What sampling method did you use?
   a. A systematic sample.
   b. A stratified sample.
   c. A cluster sample.
   d. A simple random sample
   **ANSWER:** C

27. {Apartment complex narrative} Suppose 50 of the buildings (400 total units) are for singles, and 50 buildings (400 units) are for non-singles. You randomly select 80 single units and then you randomly select 80 non-single units. What sampling method did you use?
   a. A systematic sample.
   b. A stratified sample.
   c. A cluster sample.
   d. A simple random sample
   **ANSWER:** B

28. {Apartment complex narrative} Suppose you start at a random starting point, and select every 5th unit to be in your sample, until you sample 160 units. What sampling method did you use?
   a. A systematic sample.
   b. A stratified sample.
   c. A cluster sample.
   d. A simple random sample
   **ANSWER:** A
29. Which of the following situations could cause bias in the results of a telephone survey?
   a. A phone number in the sample was found to be ‘not in service’ or ‘disconnected’.
   b. The person who answered the phone refused to participate.
   c. There was no answer, so the interviewer gave up and called someone else.
   d. Each of the above would cause bias in the results.
   **ANSWER:** D

30. Explain why it is so important that researchers report the response rates for their surveys.
   **ANSWER:** THE LOWER THE RESPONSE RATE, THE LESS THE RESULTS CAN BE GENERALIZED TO THE POPULATION AS A WHOLE, DUE TO BIAS. THOSE WHO FEEL STRONGLY ABOUT AN ISSUE ARE THE MOST LIKELY TO RESPOND.

31. Explain what is wrong with a poll conducted on a TV news program that asks viewers to call in with their opinion.
   **ANSWER:** THIS IS A VOLUNTEER OR SELF-SELECTED SAMPLE, AND IS EXTREMELY BIASED AND SHOULD BE DISREGARDED.