

**True / False Questions**

1. Statistics is the science of collecting, organizing, analyzing, interpreting, and presenting data.

True False

2. Inferential statistics refers to generalizing from a sample to a population, estimating unknown parameters, drawing conclusions, and making decisions.

True False

3. Descriptive statistics refers to summarizing data rather than generalizing about the population.

True False

4. Estimating parameters and testing hypotheses are important aspects of descriptive statistics.

True False

5. Inconsistent treatment of data by a researcher is a symptom of poor survey or research design.

True False

6. *Empirical data* are collected through observations and/or experiments.

True False

7. *Business intelligence* refers to collecting, storing, accessing, and analyzing data on the company's operations in order to make better business decisions.

True False

8. When a statistician omits data contrary to her findings in a study, she is justified as long as the sample supports her objective.

True False

9. A strong correlation between *A* and *B* would imply that *B* is caused by *A*.

True False

10. The *post hoc* fallacy says that when *B* follows *A* then *B* is caused by *A*.

True False

11. A statistical test may be significant yet have no practical importance.

True False

12. Valid statistical inferences cannot be made when sample sizes are small.

True False

13. Statistics is an essential part of critical thinking because it allows us to transform the empirical evidence from a sample so it will agree with our preferred conclusions.

True False

14. Statistical challenges include imperfect data, practical constraints, and ethical dilemmas.

True False

15. A business data analyst needs a PhD in statistics.

True False

16. The science of statistics tells us whether the sample evidence is convincing.

True False

17. Pitfalls to consider in a statistical test include nonrandom samples, small sample size, and lack of causal links.

True False

18. In business communication, a table of numbers is preferred to a graph because it is more able to convey meaning.

True False

19. Statistical data analysis can often distinguish between real vs. perceived ethical issues.

True False

20. Excel has limited use in business because advanced statistical software is widely available.

True False

21. Statistics helps surmount language barriers to solve problems in multinational businesses.

True False

22. Statistics can help you handle either too little or too much information.

True False

23. Predicting a presidential candidate's percent of the statewide vote from a sample of 800 voters would be an example of *inferential* statistics.

True False

24. Surveying electric vehicle owners would provide a representative random sample of Americans' views on global warming policies.

True False

25. An example of *descriptive* statistics would be reporting the percent of students in your accounting class that attended the review session for the last exam.

True False

### Multiple Choice Questions

26. "Bob must be rich. He's a lawyer, and lawyers make lots of money." This statement *best* illustrates which fallacy?

- A. Using poor survey methods
- B. Confusing significance with importance
- C. Unconscious bias
- D. Generalizing from an average to an individual

27. Which is *not* an ethical obligation of a statistician? Explain.

- A. To know and follow accepted procedures
- B. To ensure data integrity and accurate calculations
- C. To support client wishes in drawing conclusions from the data
- D. To acknowledge sources of financial support

28. Which of the following statements is *correct*?

- A. A parameter is a measure that is calculated from a sample.
- B. Statistics is the science of collecting, organizing, analyzing, interpreting, and presenting data.
- C. For day-to-day data business analysis, most firms rely on a large staff of expert statisticians.
- D. A statistical test result that is significant also has practical importance.

29. Which is *least likely* to be an application where statistics will be useful?

- A. Predicting whether an airfare is likely to rise or fall
- B. Designing the most desirable features for a ski pass
- C. Deciding whether offering Rice Krispies improves restaurant sales
- D. Choosing the wording of a corporate policy prohibiting smoking

30. Because 25 percent of the students in my morning statistics class watch eight or more hours of television a week, I conclude that 25 percent of all students at the university watch eight or more hours of television a week. The most important logical weakness of this conclusion would be:

- A. relying on any sample instead of surveying every student.
- B. using a sample that may not be representative of all students.
- C. failing to correct for unconscious interviewer bias.
- D. assuming cause and effect where none exists.

31. Which of the following is *not* a characteristic of an ideal statistician?

- A. Technically current (e.g., software)
- B. Communicates well (both written and oral)
- C. Advocates client's objectives
- D. Can deal with imperfect information

32. Which of the following statements is *not* true?

- A. Statistics helps refine theories through ongoing hypothesis testing.
- B. Statistics is the science of collecting, organizing, analyzing, interpreting, and presenting data.
- C. Estimating parameters is an important aspect of descriptive statistics.
- D. Statistical challenges include imperfect data and practical constraints.

33. Which is *not* a practical constraint facing the business researcher or data analyst?

- A. Time and money are always limited.
- B. The world is no laboratory, so some experiments are impractical.
- C. Research on human subjects is fraught with danger and ethical issues.
- D. Survey respondents usually will tell the truth if well compensated.

34. Which is *not* an essential characteristic of a good business data analyst?

- A. Effective writer
- B. Stays current on techniques
- C. Has a Ph.D. or master's degree in statistics
- D. Can deal with imperfect information

35. An ethical statistical consultant would *not* always:

- A. follow accepted statistical procedures.
- B. support management's desired conclusions.
- C. acknowledge sources of financial support.
- D. report limitations of the data.

36. The NASA experiences with the *Challenger* and *Columbia* disasters suggest that:

- A. statistics is not applicable to space endeavors.
- B. limited data may still contain important clues.
- C. good engineers can eliminate risks in space flight.
- D. space flight is only slightly more risky than commercial air travel.

37. Which is *not* a goal of the ethical data analyst?

- A. To be an honest broker of data
- B. To learn to downplay inconvenient data
- C. To understand the firm's code of ethics (or help create one)
- D. To look for hidden agendas in data collection

38. Which of the following statements is *not* true?

- A. A statistic is a single measure (usually numerical) that is calculated from a sample.
- B. Statistics is the science of collecting, organizing, analyzing, interpreting, and presenting data.
- C. For day-to-day data business analysis, most firms rely on a large staff of expert statisticians.
- D. A statistical test may be significant yet have no practical importance.

39. "Smoking is not harmful. My Aunt Harriet smoked, but lived to age 90." This *best* illustrates which fallacy?

- A. Unconscious bias
- B. Significance versus practical importance
- C. *Post hoc* reasoning
- D. Small sample generalization

40. Which *best* illustrates the distinction between statistical significance and practical importance?

- A. "In 2006, 240 out of 400 statistics students at Oxnard Technical College sold their textbooks at the end of the semester, compared with 220 out of 330 students in 2005, a significant decrease."
- B. "Our new manufacturing technique has increased the life of the 80 GB USB AsimoDrive external hard disk significantly, from 240,000 hours to 250,000 hours."
- C. "In 50,000 births, the new vaccine reduced the incidence of infant mortality in Morrovia significantly from 14.2 deaths per 1000 births to 10.3 deaths per 1000 births."
- D. "The new Sky Penetrator IV business jet's cruising range has increased significantly from 3,975 miles to 4,000 miles."

41. "Circulation fell in the month after the new editor took over the newspaper *Oxnard News Herald*. The new editor should be fired." Which is *not* a serious fallacy in this conclusion?

- A. Generalizing from a small sample
- B. Applying *post hoc* reasoning
- C. Failing to identify causes
- D. Using a biased sample

42. An ethical data analyst would be *least likely* to:

- A. check data for accuracy.
- B. cite his/her data sources and their limitations.
- C. acknowledge sources of financial support.
- D. rely on consultants for all calculations.

43. "Tom's SUV rolled over. SUVs are dangerous." This *best* illustrates which fallacy?

- A. Unconscious bias
- B. Significance versus practical importance
- C. *Post hoc* reasoning
- D. Small sample generalization

44. "Bob didn't wear his lucky T-shirt to class, so he failed his chemistry exam." This *best* illustrates which fallacy?

- A. Small sample generalization
- B. Poor survey methods
- C. *Post hoc* reasoning
- D. More than one of the above

45. Which is *not* a reason for an average student to study statistics?

- A. Improve technical writing skills
- B. Gain information management skills
- C. Enhance technical literacy
- D. Learn stock market strategies

46. Which is *not* a likely area of application of statistics in business?

- A. Auditing supplier invoices for correct payment
- B. Questioning the executives' strategic decisions
- C. Looking for patterns in a large marketing database
- D. Making forecasts of several key product lines

47. Which is *not* a likely task of descriptive statistics?

- A. Summarizing a sample
- B. Describing data numerically
- C. Estimating unknown parameters
- D. Making visual displays of data

48. We would associate the term *inferential statistics* with which task?

- A. Making visual displays of data
- B. Estimating unknown parameters
- C. Describing a sample of data
- D. Tabulating a survey

### Short Answer Questions

49. How might statistics be useful in determining the correct width of doorways in a convalescent care facility so that 99 percent of the "typical" wheelchairs can pass through the doorway without coming closer than 6 inches on either side?

50. Established risk factors such as cholesterol and obesity can predict who will get heart disease about 80 percent of the time. Adding a new test called CRP can raise this percentage to 81 percent—a statistically significant difference. But would this improvement be of practical importance to a physician? To a patient? Discuss.

51. Bob said, "Since statistics cannot tell for certain whether one thing caused another, there is no point in even reporting probabilities." Argue both for and against Bob's statement.

52. Bob said, "Why study math and statistics? I'm majoring in human resources because it's people that are important in business, not numbers." Argue both for and against Bob's statement.

## Chapter 01 Overview of Statistics **Answer Key**

### True / False Questions

1. Statistics is the science of collecting, organizing, analyzing, interpreting, and presenting data.

**TRUE**

This is one of many good definitions of statistics.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 01-01 Define statistics and explain some of its uses in business.*

*Topic: What Is Statistics?*

- Inferential statistics refers to generalizing from a sample to a population, estimating unknown parameters, drawing conclusions, and making decisions.

**TRUE**

We can use statistics either to describe data or to infer something about a population.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 01-01 Define statistics and explain some of its uses in business.*

*Topic: Uses of Statistics*

- Descriptive statistics refers to summarizing data rather than generalizing about the population.

**TRUE**

When we do not infer, we are only describing the available sample data.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 01-01 Define statistics and explain some of its uses in business.*

*Topic: Uses of Statistics*

4. Estimating parameters and testing hypotheses are important aspects of descriptive statistics.

**FALSE**

When we generalize to a population we are using *inferential* statistics.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 2 Medium*

*Learning Objective: 01-01 Define statistics and explain some of its uses in business.*

*Topic: Uses of Statistics*

5. Inconsistent treatment of data by a researcher is a symptom of poor survey or research design.

**FALSE**

Good survey data can still be misused or misinterpreted.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 2 Medium*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

*Topic: Critical Thinking*

6. *Empirical data* are collected through observations and/or experiments.

**TRUE**

Empirical data are contrasted with *a priori* estimates (e.g., expecting 10 heads in 20 coin flips).

*AACSB: Reflective Thinking*

*Blooms: Remember*

*Difficulty: 2 Medium*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

*Topic: Critical Thinking*

7. *Business intelligence* refers to collecting, storing, accessing, and analyzing data on the company's operations in order to make better business decisions.

**TRUE**

See Wikipedia for similar definitions of business intelligence.

*AACSB: Reflective Thinking*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 01-01 Define statistics and explain some of its uses in business.*

*Topic: Uses of Statistics*

8. When a statistician omits data contrary to her findings in a study, she is justified as long as the sample supports her objective.

**FALSE**

We do not omit data unless it is proven to be an error.

*AACSB: Ethics*

*Blooms: Understand*

*Difficulty: 2 Medium*

*Learning Objective: 01-03 State the common challenges facing business professionals using statistics.*

*Topic: Statistical Challenges*

9. A strong correlation between  $A$  and  $B$  would imply that  $B$  is caused by  $A$ .

**FALSE**

Temporal sequence does not prove causation.

*AACSB: Reflective Thinking*

*Blooms: Understand*

*Difficulty: 1 Easy*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

*Topic: Critical Thinking*

10. The *post hoc* fallacy says that when *B* follows *A* then *B* is caused by *A*.

**TRUE**

Temporal sequence does not prove causation.

*AACSB: Reflective Thinking*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

*Topic: Critical Thinking*

11. A statistical test may be significant yet have no practical importance.

**TRUE**

Large samples sometimes reveal tiny effects that may not matter very much.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 1 Easy*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

*Topic: Critical Thinking*

12. Valid statistical inferences cannot be made when sample sizes are small.

**FALSE**

Small samples may be all that we have, and statistics does have rules for them.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 2 Medium*

*Learning Objective: 01-03 State the common challenges facing business professionals using statistics.*

*Topic: Statistical Challenges*

13. Statistics is an essential part of critical thinking because it allows us to transform the empirical evidence from a sample so it will agree with our preferred conclusions.

**FALSE**

Ethical analysts challenge their beliefs with data rather than forcing data to their beliefs.

*AACSB: Ethics*

*Blooms: Understand*

*Difficulty: 1 Easy*

*Learning Objective: 01-03 State the common challenges facing business professionals using statistics.*

*Topic: Statistical Challenges*

14. Statistical challenges include imperfect data, practical constraints, and ethical dilemmas.

**TRUE**

The list is longer, but these three are big challenges.

*AACSB: Ethics*

*Blooms: Understand*

*Difficulty: 1 Easy*

*Learning Objective: 01-03 State the common challenges facing business professionals using statistics.*

*Topic: Statistical Challenges*

15. A business data analyst needs a PhD in statistics.

**FALSE**

Every business person does some statistics.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 01-02 List reasons for a business student to study statistics.*

*Topic: Why Study Statistics?*

16. The science of statistics tells us whether the sample evidence is convincing.

**TRUE**

There are clear scientific rules for statistical inference.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 1 Easy*

*Learning Objective: 01-01 Define statistics and explain some of its uses in business.*

*Topic: What Is Statistics?*

17. Pitfalls to consider in a statistical test include nonrandom samples, small sample size, and lack of causal links.

**TRUE**

These are among many other pitfalls.

*AACSB: Reflective Thinking*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

*Topic: Critical Thinking*

18. In business communication, a table of numbers is preferred to a graph because it is more able to convey meaning.

**FALSE**

Although tables can show exact numbers, a good graph may be more helpful.

*AACSB: Communication*

*Blooms: Understand*

*Difficulty: 1 Easy*

*Learning Objective: 01-03 State the common challenges facing business professionals using statistics.*

*Topic: Statistical Challenges*

19. Statistical data analysis can often distinguish between real vs. perceived ethical issues.

**TRUE**

Proper framing of a question may reveal that there is no real ethical issue.

*AACSB: Ethics*

*Blooms: Understand*

*Difficulty: 1 Easy*

*Learning Objective: 01-03 State the common challenges facing business professionals using statistics.*

*Topic: Statistical Challenges*

20. Excel has limited use in business because advanced statistical software is widely available.

**FALSE**

Small businesses may lack advanced software (and training to use it).

*AACSB: Technology*

*Blooms: Understand*

*Difficulty: 1 Easy*

*Learning Objective: 01-01 Define statistics and explain some of its uses in business.*

*Topic: What Is Statistics?*

21. Statistics helps surmount language barriers to solve problems in multinational businesses.

**TRUE**

Statistics is part of the international language of science.

*AACSB: Diversity*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 01-02 List reasons for a business student to study statistics.*

*Topic: Why Study Statistics?*

22. Statistics can help you handle either too little or too much information.

**TRUE**

Statistical tasks include reducing lots of data or finding meaning in large piles of data.

*AACSB: Technology*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 01-02 List reasons for a business student to study statistics.*

*Topic: Why Study Statistics?*

23. Predicting a presidential candidate's percent of the statewide vote from a sample of 800 voters would be an example of *inferential* statistics.

**TRUE**

Generalizing from a sample is an *inference*.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 2 Medium*

*Learning Objective: 01-01 Define statistics and explain some of its uses in business.*

*Topic: Uses of Statistics*

24. Surveying electric vehicle owners would provide a representative random sample of Americans' views on global warming policies.

**FALSE**

Not a random sample of all drivers.

*AACSB: Reflective Thinking*

*Blooms: Apply*

*Difficulty: 1 Easy*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

*Topic: Critical Thinking*

25. An example of *descriptive* statistics would be reporting the percent of students in your accounting class that attended the review session for the last exam.

**TRUE**

As long as you don't generalize it is a *descriptive* statistic.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 01-01 Define statistics and explain some of its uses in business.*

*Topic: Uses of Statistics*

## Multiple Choice Questions

26. "Bob must be rich. He's a lawyer, and lawyers make lots of money." This statement *best* illustrates which fallacy?

- A. Using poor survey methods
- B. Confusing significance with importance
- C. Unconscious bias
- D. Generalizing from an average to an individual

Many lawyers do not work for big firms (remember *My Cousin Vinnie?*).

*AACSB: Reflective Thinking*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

*Topic: Critical Thinking*

27. Which is *not* an ethical obligation of a statistician? Explain.

- A. To know and follow accepted procedures
- B. To ensure data integrity and accurate calculations
- C. To support client wishes in drawing conclusions from the data
- D. To acknowledge sources of financial support

Review the list of ethical responsibilities.

*AACSB: Ethics*

*Blooms: Understand*

*Difficulty: 1 Easy*

28. Which of the following statements is *correct*?
- A. A parameter is a measure that is calculated from a sample.
  - B.** Statistics is the science of collecting, organizing, analyzing, interpreting, and presenting data.
  - C. For day-to-day data business analysis, most firms rely on a large staff of expert statisticians.
  - D. A statistical test result that is significant also has practical importance.

Check you definitions and uses of statistics.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 2 Medium*

*Learning Objective: 01-01 Define statistics and explain some of its uses in business.*

*Topic: What Is Statistics?*

29. Which is *least likely* to be an application where statistics will be useful?

- A. Predicting whether an airfare is likely to rise or fall
- B. Designing the most desirable features for a ski pass
- C. Deciding whether offering Rice Krispies improves restaurant sales
- D. Choosing the wording of a corporate policy prohibiting smoking

Policy wording is probably up to writers.

*AACSB: Analytic*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 01-02 List reasons for a business student to study statistics.*

*Topic: Uses of Statistics*

30. Because 25 percent of the students in my morning statistics class watch eight or more hours of television a week, I conclude that 25 percent of all students at the university watch eight or more hours of television a week. The most important logical weakness of this conclusion would be:

- A. relying on any sample instead of surveying every student.
- B.** using a sample that may not be representative of all students.
- C. failing to correct for unconscious interviewer bias.
- D. assuming cause and effect where none exists.

Generalizing from a nonrandom sample is risky.

*AACSB: Reflective Thinking*

*Blooms: Apply*

*Difficulty: 3 Hard*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

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31. Which of the following is *not* a characteristic of an ideal statistician?

- A. Technically current (e.g., software)
- B. Communicates well (both written and oral)
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There is an unattractive name for a consultant who always agrees with the client.

*AACSB: Ethics*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 01-03 State the common challenges facing business professionals using statistics.*

*Topic: Statistical Challenges*

32. Which of the following statements is *not* true?

- A. Statistics helps refine theories through ongoing hypothesis testing.
- B. Statistics is the science of collecting, organizing, analyzing, interpreting, and presenting data.
- C. Estimating parameters is an important aspect of descriptive statistics.
- D. Statistical challenges include imperfect data and practical constraints.

Estimating a population parameter is an *inference*.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 2 Medium*

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33. Which is *not* a practical constraint facing the business researcher or data analyst?

- A. Time and money are always limited.
- B. The world is no laboratory, so some experiments are impractical.
- C. Research on human subjects is fraught with danger and ethical issues.
- D. Survey respondents usually will tell the truth if well compensated.

Paid respondents may try to tell you what you want to hear.

*AACSB: Ethics*

*Blooms: Understand*

*Difficulty: 2 Medium*

*Learning Objective: 01-03 State the common challenges facing business professionals using statistics.*

*Topic: Statistical Challenges*

34. Which is *not* an essential characteristic of a good business data analyst?

- A. Effective writer
- B. Stays current on techniques
- C. Has a Ph.D. or master's degree in statistics
- D. Can deal with imperfect information

No advanced degree is needed for basic statistics, which is why all business students study it.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 01-03 State the common challenges facing business professionals using statistics.*

*Topic: Statistical Challenges*

35. An ethical statistical consultant would *not* always:

- A. follow accepted statistical procedures.
- B. support management's desired conclusions.
- C. acknowledge sources of financial support.
- D. report limitations of the data.

There is a nasty name for a consultant who always agrees with management.

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- C. good engineers can eliminate risks in space flight.
- D. space flight is only slightly more risky than commercial air travel.

When small samples are all that we have, we must study them carefully.

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*Blooms: Apply*

*Difficulty: 1 Easy*

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A. To be an honest broker of data

**B.** To learn to downplay inconvenient data

C. To understand the firm's code of ethics (or help create one)

D. To look for hidden agendas in data collection

We do not ignore data unless it is an actual error.

*AACSB: Ethics*

*Blooms: Remember*

*Difficulty: 2 Medium*

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*Topic: Statistical Challenges*

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- A. A statistic is a single measure (usually numerical) that is calculated from a sample.
- B. Statistics is the science of collecting, organizing, analyzing, interpreting, and presenting data.
- C. For day-to-day data business analysis, most firms rely on a large staff of expert statisticians.
- D. A statistical test may be significant yet have no practical importance.

Few firms have staffs of statistics experts, so all of us need to know the basics.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 2 Medium*

*Learning Objective: 01-01 Define statistics and explain some of its uses in business.*

*Topic: Uses of Statistics*

39. "Smoking is not harmful. My Aunt Harriet smoked, but lived to age 90." This *best* illustrates which fallacy?

- A. Unconscious bias
- B. Significance versus practical importance
- C. *Post hoc* reasoning
- D. Small sample generalization

Individual cases sometimes violate causation.

*AACSB: Reflective Thinking*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

*Topic: Critical Thinking*

40. Which *best* illustrates the distinction between statistical significance and practical importance?
- A. "In 2006, 240 out of 400 statistics students at Oxnard Technical College sold their textbooks at the end of the semester, compared with 220 out of 330 students in 2005, a significant decrease."
  - B.** "Our new manufacturing technique has increased the life of the 80 GB USB AsimoDrive external hard disk significantly, from 240,000 hours to 250,000 hours."
  - C. "In 50,000 births, the new vaccine reduced the incidence of infant mortality in Morrovia significantly from 14.2 deaths per 1000 births to 10.3 deaths per 1000 births."
  - D. "The new Sky Penetrator IV business jet's cruising range has increased significantly from 3,975 miles to 4,000 miles."

Consumers would not notice because 240,000 hours is 27 years.

*AACSB: Reflective Thinking*

*Blooms: Evaluate*

*Difficulty: 3 Hard*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

*Topic: Critical Thinking*

41. "Circulation fell in the month after the new editor took over the newspaper *Oxnard News Herald*. The new editor should be fired." Which is *not* a serious fallacy in this conclusion?

- A. Generalizing from a small sample
- B. Applying *post hoc* reasoning
- C. Failing to identify causes
- D. Using a biased sample

There is no real sample, just shaky logical inferences.

*AACSB: Reflective Thinking*

*Blooms: Evaluate*

*Difficulty: 2 Medium*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

*Topic: Critical Thinking*

42. An ethical data analyst would be *least likely* to:

- A. check data for accuracy.
- B. cite his/her data sources and their limitations.
- C. acknowledge sources of financial support.
- D. rely on consultants for all calculations.

When you farm out your calculations, you have lost control of your work.

*AACSB: Ethics*

*Blooms: Understand*

*Difficulty: 1 Easy*

*Learning Objective: 01-03 State the common challenges facing business professionals using statistics.*

*Topic: Statistical Challenges*

43. "Tom's SUV rolled over. SUVs are dangerous." This *best* illustrates which fallacy?

- A. Unconscious bias
- B. Significance versus practical importance
- C. *Post hoc* reasoning
- D. Small sample generalization

One instance proves little.

*AACSB: Reflective Thinking*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

*Topic: Critical Thinking*

44. "Bob didn't wear his lucky T-shirt to class, so he failed his chemistry exam."  
This *best* illustrates which fallacy?

- A. Small sample generalization
- B. Poor survey methods
- C. *Post hoc* reasoning
- D. More than one of the above

There is no credible causal link between these two events.

*AACSB: Reflective Thinking*

*Blooms: Apply*

*Difficulty: 2 Medium*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

*Topic: Critical Thinking*

45. Which is *not* a reason for an average student to study statistics?

- A. Improve technical writing skills
- B. Gain information management skills
- C. Enhance technical literacy
- D. Learn stock market strategies

To learn about the stock market, you should probably study finance.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 01-02 List reasons for a business student to study statistics.*

*Topic: Why Study Statistics?*

46. Which is *not* a likely area of application of statistics in business?

- A. Auditing supplier invoices for correct payment
- B. Questioning the executives' strategic decisions**
- C. Looking for patterns in a large marketing database
- D. Making forecasts of several key product lines

Business strategy may involve some statistics but not like the others listed here.

*AACSB: Analytic*

*Blooms: Understand*

*Difficulty: 1 Easy*

*Learning Objective: 01-02 List reasons for a business student to study statistics.*

*Topic: Uses of Statistics*

47. Which is *not* a likely task of descriptive statistics?

- A. Summarizing a sample
- B. Describing data numerically
- C. Estimating unknown parameters
- D. Making visual displays of data

Estimating a population parameter is an *inference*.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 2 Medium*

*Learning Objective: 01-01 Define statistics and explain some of its uses in business.*

*Topic: Uses of Statistics*

48. We would associate the term *inferential statistics* with which task?

- A. Making visual displays of data
- B. Estimating unknown parameters
- C. Describing a sample of data
- D. Tabulating a survey

Estimating a population parameter is an *inference*.

*AACSB: Analytic*

*Blooms: Remember*

*Difficulty: 1 Easy*

*Learning Objective: 01-01 Define statistics and explain some of its uses in business.*

## **Short Answer Questions**

49. How might statistics be useful in determining the correct width of doorways in a convalescent care facility so that 99 percent of the "typical" wheelchairs can pass through the doorway without coming closer than 6 inches on either side?

Large samples could be taken of wheelchair widths and the space needed on either side, and averages and the 99<sup>th</sup> percentile could be computed for widths of major brands of old and new wheelchairs, along with the proportion of each type of wheelchair in use.

Feedback: Large samples could be taken of wheelchair widths and the space needed on either side, and averages could be computed. Statistics can then be applied to find the 99<sup>th</sup> percentiles. One way is to measure the widths of major brands of wheelchairs currently being sold, being sure that people are sitting in them and using their hands to move the wheels to measure the necessary clearance. Then take a similar survey of older wheelchairs that still are used. Estimate the proportion of each type of wheelchair in use, to determine what width is required for 99 percent to meet the requirement. You might also find that some wheelchair users carry a cane in their laps, which may protrude. To learn how to estimate percentiles, you need a basic class in statistics.

*AACSB: Reflective Thinking*

*Blooms: Create*

*Difficulty: 3 Hard*

*Learning Objective: 01-01 Define statistics and explain some of its uses in business.*

*Topic: Uses of Statistics*

50. Established risk factors such as cholesterol and obesity can predict who will get heart disease about 80 percent of the time. Adding a new test called CRP can raise this percentage to 81 percent—a statistically significant difference. But would this improvement be of practical importance to a physician? To a patient? Discuss.

In tests involving millions of patients, even a slightly improved test might benefit many individuals, though to the individual patient or physician the benefit might not be apparent.

Feedback: A single physician might feel that such a small improvement in medical diagnostics might not help very much in predicting a particular patient's chances of getting heart disease. However, in tests involving millions of patients, even a slightly improved test might benefit many individuals. It is a question of perspective (micro versus macro). Also, as medical tests improve, the potential incremental gains become smaller.

*AACSB: Reflective Thinking*

*Blooms: Evaluate*

*Difficulty: 3 Hard*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

*Topic: Critical Thinking*

51. Bob said, "Since statistics cannot tell for certain whether one thing caused another, there is no point in even reporting probabilities." Argue both for and against Bob's statement.

We usually cannot prove cause and effect using statistics alone, but correlations between events can point researchers in a certain direction and statistics is a guide to action when there is a logical reason to suppose that cause and effect may exist, even if science hasn't yet proven the case fully.

Feedback: Bob is correct in saying that we usually cannot prove cause and effect using statistics alone. But probabilities and correlations between events can point researchers in a certain direction. And many people do accept that statistics is a guide to action, if there is some logical reason to suppose that cause and effect may exist, even if science hasn't yet proven the case fully. Think how many people purchase health food and vitamin supplements, or seek holistic treatments for various diseases.

*AACSB: Reflective Thinking*

*Blooms: Evaluate*

*Difficulty: 2 Medium*

*Learning Objective: 01-04 List and explain common statistical pitfalls.*

*Topic: Critical Thinking*

52. Bob said, "Why study math and statistics? I'm majoring in human resources because it's people that are important in business, not numbers." Argue both for and against Bob's statement.

Bob is correct in that organizations consist of people whose decisions determine the company's financial well-being and future, but all organizations (including HR specialists) rely on statistics and data to keep track of their operations, assets (human and financial), and financial progress.

Feedback: Bob is correct in that organizations consist of people, and their interactions and decisions determine the company's financial well-being and future. However, he is missing something essential. All organizations rely on statistics and data to keep track of their operations and financial progress. Without statistics and math, no company can exist. And human resources professionals use data just as much as any other business specialty. In fact, many statistical techniques were developed by psychologists in order to help understand humans and their interactions.

*AACSB: Reflective Thinking*

*Blooms: Evaluate*

*Difficulty: 2 Medium*

*Learning Objective: 01-01 Define statistics and explain some of its uses in business.*

*Topic: Uses of Statistics*