

Chapter_01_Data_and_Statistics

Multiple Choice

1. Which of the following is an example of quantitative data?

- a. The player's number on a baseball uniform
- b. The serial number on a one-dollar bill
- c. The part number of an inventory item
- d. The number of people in a waiting line

ANSWER:

d

2. Which of the following is NOT an example of descriptive statistics?

- a. A histogram depicting the age distribution for 30 randomly selected students
- b. An estimate of the number of Alaska residents who have visited Canada
- c. A table summarizing the data collected in a sample of new-car buyers
- d. The proportion of mailed-out questionnaires that were returned

ANSWER:

b

3. Which of the following is an example of categorical data?

- a. Social security number
- b. Score on a multiple-choice exam
- c. Height, in meters, of a diving board
- d. Number of square feet of carpet

ANSWER:

a

4. The number of observations in a complete data set having 10 elements and 5 variables is ____.

- a. 5
- b. 10
- c. 25
- d. 50

ANSWER:

b

5. Facts and figures collected, analyzed, and summarized for presentation and interpretation are called ____.

- a. data
- b. variables
- c. elements
- d. variables and elements

ANSWER:

a

6. The entities on which data are collected are ____.

- a. elements
- b. populations
- c. sets
- d. samples

ANSWER:

a

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7. The set of measurements collected for an element is called a(n) _____.

- a. census
- b. variable
- c. observation
- d. sample

ANSWER:

c

8. A characteristic of interest for the elements is called a(n) _____.

- a. sample
- b. data set
- c. variable
- d. observation

ANSWER:

c

9. All data collected in a study are referred to as the _____.

- a. census
- b. inference
- c. variable
- d. data set

ANSWER:

d

10. In a data set, the number of observations will always be the same as the number of _____.

- a. variables
- b. elements
- c. data sets
- d. data

ANSWER:

b

11. Which of the following is NOT a scale of measurement?

- a. Nominal
- b. Ordinal
- c. Interval
- d. Categorical

ANSWER:

d

12. When the data are labels or names used to identify an attribute of the elements, the variable has which scale of measurement?

- a. Nominal
- b. Ordinal
- c. Interval
- d. Ratio

ANSWER:

a

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13. When the data are labels or names used to identify an attribute of the elements and the rank of the data is meaningful, the variable has which scale of measurement?

- a. Nominal
- b. Ordinal
- c. Interval
- d. Ratio

ANSWER:

b

14. When the data have the properties of ordinal data and the interval between observations is expressed in terms of a fixed unit of measure, the variable has which scale of measurement?

- a. Nominal
- b. Ordinal
- c. Interval
- d. Ratio

ANSWER:

c

15. When the data have the properties of interval data and the multiplication or division of two values is meaningful, the variable has which scale of measurement?

- a. Nominal
- b. Ordinal
- c. Interval
- d. Ratio

ANSWER:

d

16. Which two scales of measurement can be either numeric or nonnumeric?

- a. Nominal and ratio
- b. Ordinal and interval
- c. Interval and ordinal
- d. Nominal and ordinal

ANSWER:

d

17. Which of the following variables uses the interval scale of measurement?

- a. Name of stock exchange
- b. Time
- c. SAT scores
- d. Social security number

ANSWER:

c

18. Which of the following variables uses the ratio scale of measurement?

- a. Name of stock exchange
- b. Time
- c. SAT scores

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- d. Social security number

ANSWER:

b

19. Quantitative data _____.

- a. are always nonnumeric
- b. may be either numeric or nonnumeric
- c. are always numeric
- d. are always labels

ANSWER:

c

20. Categorical data _____.

- a. are always nonnumeric
- b. may be either numeric or nonnumeric
- c. are always numeric
- d. indicate either how much or how many

ANSWER:

b

21. Which type of analytics is the set of analytical techniques that yield a course of action?

- a. Descriptive
- b. Predictive
- c. Prescriptive
- d. Data

ANSWER:

c

22. What organization developed the report, "Ethical Guidelines for Statistical Practice"?

- a. Ethics Committee for Statistical Practices
- b. American Statistical Association
- c. International Statistical Organization
- d. Federal Bureau for Ethical Practices in Statistics

ANSWER:

b

23. Arithmetic operations are inappropriate for _____.

- a. categorical data
- b. quantitative data
- c. both categorical and quantitative data
- d. large data sets

ANSWER:

a

24. In a questionnaire, respondents are asked to mark their gender as Male, Female, Transgender MtoF, Transgender FtoM, Non-binary, or Intersex. Gender is an example of which type of variable?

- a. Categorical
- b. Quantitative
- c. Interval

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d. Ratio

ANSWER:

a

25. In a questionnaire, respondents are asked to record their age in years. Age is an example of a _____.

- a. categorical variable
- b. quantitative variable
- c. categorical or quantitative variable, depending on how the respondents answered the question
- d. ordinal variable

ANSWER:

b

26. In an application for a credit card, potential customers are asked for their social security numbers. A social security number is an example of a _____.

- a. categorical variable
- b. quantitative variable
- c. categorical or quantitative variable, depending on how the respondents answered the question
- d. ratio variable

ANSWER:

a

27. Temperature is an example of which scale of measurement?

- a. Nominal
- b. Ordinal
- c. Interval
- d. Ratio

ANSWER:

c

28. For ease of data entry into a university database, 1 denotes the student is enrolled in an undergraduate degree program, 2 indicates the student is enrolled in a master's degree program, and 3 indicates the student is enrolled in a doctoral degree program. In this case, the data are which scale of measurement?

- a. Nominal
- b. Ordinal
- c. Interval
- d. Ratio

ANSWER:

b

29. Income is an example of _____.

- a. categorical data
- b. either categorical or quantitative data
- c. currency data
- d. quantitative data

ANSWER:

d

30. The birth weight of newborns, measured in grams, is an example of _____.

- a. categorical data

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- b. either categorical or quantitative data
- c. neither categorical nor quantitative data
- d. quantitative data

ANSWER:

d

31. The graph below best exemplifies a _____.



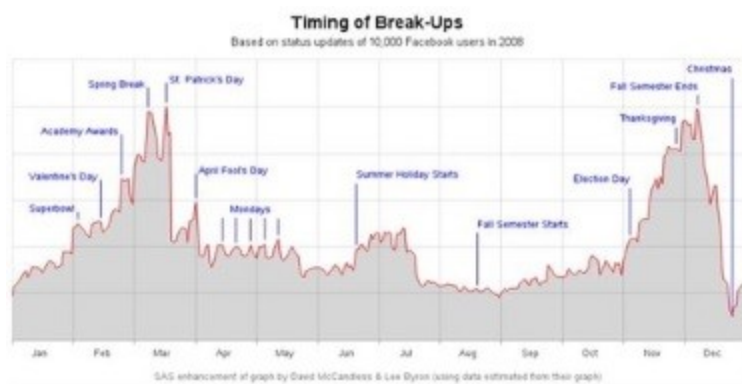
(Graph courtesy of Robert Allison.)

- a. bar graph
- b. time series graph
- c. cross-sectional graph
- d. line graph

ANSWER:

b

32. The graph below best exemplifies a _____.



- a. bar graph
- b. time series graph
- c. cross-sectional graph
- d. line graph

ANSWER:

b

33. Data collected at the same, or approximately the same, point in time are considered which one of the following types

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of data?

- a. Time series
- b. Static
- c. Cross-sectional
- d. One-dimensional

ANSWER:

c

34. Data collected over several time periods are considered which one of the following types of data?

- a. Time series
- b. Time-controlled
- c. Cross-sectional
- d. Time dependent

ANSWER:

a

35. Statistical studies in which researchers do not control variables of interest are _____.

- a. experimental studies
- b. uncontrolled experimental studies
- c. not of any value
- d. observational studies

ANSWER:

d

36. Statistical studies in which researchers control variables of interest are referred to as which type of study?

- a. Experimental
- b. Control observational
- c. Non-experimental
- d. Observational

ANSWER:

a

37. Which type of analytics encompasses the set of analytical techniques that describe what has happened in the past?

- a. Descriptive
- b. Predictive
- c. Prescriptive
- d. Data

ANSWER:

a

38. Which of the following is NOT an example of an existing source of data?

- a. The Internet
- b. Internal company records
- c. U.S. Census Bureau
- d. Data from an experiment

ANSWER:

d

39. Which of the following is NOT an example of a firm that sells or leases business database services to clients?

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- a. Dun & Bradstreet
- b. Bloomberg
- c. U.S. Census Bureau
- d. Dow Jones and Company

ANSWER:

c

40. The most common type of observational study is a(n) _____.

- a. experiment
- b. survey
- c. debate
- d. statistical inference

ANSWER:

b

41. The summaries of data, which may be tabular, graphical, or numerical, are referred to as _____.

- a. inferential statistics
- b. descriptive statistics
- c. statistical inference
- d. report generation

ANSWER:

b

42. A Scanner Data User Survey of 50 companies found that the average amount spent on scanner data per category of consumer goods was \$387,325 (Mercer Management Consulting, Inc., April 24, 1997). The \$387,325 is an example of _____.

- a. categorical data
- b. a categorical variable
- c. a descriptive statistic
- d. time series data

ANSWER:

c

43. Statistical inference _____.

- a. refers to the process of drawing inferences about the sample based on the characteristics of the population
- b. is the same as descriptive statistics
- c. is the process of drawing inferences about the population based on the information taken from the sample
- d. is the same as a census

ANSWER:

c

44. The collection of all elements of interest in a study is _____.

- a. the population
- b. the sampling
- c. statistical inference
- d. descriptive statistics

ANSWER:

a

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45. A portion of the population selected to represent the population is called ____.

- a. statistical inference
- b. descriptive statistics
- c. a census
- d. a sample

ANSWER:

d

46. The small university has exactly 800 students. Of the 800 students in the university, 360, or 45%, live in the dormitories. The 800 is an example of ____.

- a. a sample
- b. a population
- c. statistical inference
- d. descriptive statistics

ANSWER:

b

47. In a sample of 800 students in a university, 160, or 20%, are Business majors. Based on the above information, the school's paper reported, "20% of all students at the university are Business majors." This report is an example of ____.

- a. a sample
- b. a population
- c. statistical inference
- d. descriptive statistics

ANSWER:

c

48. Six hundred residents of a city are polled to obtain information on voting intentions in an upcoming city election. The 600 residents in this study are an example of a(n) ____.

- a. census
- b. sample
- c. observation
- d. population

ANSWER:

b

49. A statistics professor asked students in a class their ages. Based on this information, the professor states that the average age of students in the university is 21 years. This is an example of ____.

- a. a census
- b. descriptive statistics
- c. an experiment
- d. statistical inference

ANSWER:

d

50. The owner of a factory regularly requests a graphical summary of all employees' salaries. The graphical summary of salaries is an example of ____.

- a. a sample
- b. descriptive statistics
- c. statistical inference

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- d. an experiment

ANSWER:

b

51. The Department of Transportation of a city has noted that on average there are 14 accidents per day. The average number of accidents is an example of _____.

- a. descriptive statistics
- b. statistical inference
- c. a sample
- d. a population

ANSWER:

a

52. In a recent study based upon an inspection of 200 homes in Daisy City, 120 were found to violate one or more city codes. The city manager released a statement that 60% of Daisy City's 3,000 homes are in violation of city codes. The manager's statement is an example of _____.

- a. a census
- b. an experiment
- c. descriptive statistics
- d. statistical inference

ANSWER:

d

53. In a recent study based upon an inspection of 400 homes in Springfield, 145 were found to violate one or more city codes. The Springfield study is an example of the use of a _____.

- a. census
- b. sample
- c. probability
- d. population

ANSWER:

b

54. In a recent study based upon an inspection of 500 homes in Metropolis, 300 were found to violate one or more city codes. The manager's statement that 60% of Metropolis's 3,000 homes are in violation of city codes is _____.

- a. an accurate statement
- b. only an approximation, as it is based upon sample information
- c. obviously wrong, as it is based upon a study of only 200 homes
- d. wrong. All 3,000 homes need to be surveyed to make that statement

ANSWER:

b

55. In a sample of 3,200 registered voters, 1,440, or 45%, approve of the way the president is doing their job. The 45% approval is an example of _____.

- a. a sample
- b. descriptive statistics
- c. statistical inference
- d. a population

ANSWER:

b

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56. In a sample of 3,200 registered voters, 1,440, or 45%, approve of the way the president is doing their job. A political pollster states, "Forty five percent of all voters approve of the president." This statement is an example of _____.

- a. a sample
- b. descriptive statistics
- c. statistical inference
- d. a population

ANSWER: c

57. The process of analyzing sample data to draw conclusions about the characteristics of a population is called _____.

- a. descriptive statistics
- b. statistical inference
- c. data analysis
- d. data summarization

ANSWER: b

58. In a post office, the mailboxes are numbered from 1 to 5,000. These numbers represent _____.

- a. categorical data
- b. time series data
- c. cross-sectional data
- d. quantitative data

ANSWER: a

59. The average age in a sample of 90 students at City College is 20. From this sample, it can be concluded that the average age of all the students at City College _____.

- a. must be more than 20, as the population is always larger than the sample
- b. must be less than 20, as the sample is only a part of the population
- c. could not be 20
- d. could be larger, smaller, or equal to 20

ANSWER: d

60. Which type of analytics consists of analytical techniques that use models constructed from past data to predict the future or to assess the impact of one variable on another?

- a. Descriptive
- b. Predictive
- c. Prescriptive
- d. Data

ANSWER: b

61. Which of the following terms is used to refer to the process of capturing, storing, and maintaining data?

- a. Data warehousing
- b. Data mining
- c. Data analysis
- d. Data collection

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ANSWER: a

62. A sample of five *Fortune* 500 companies showed the following revenues (\$ millions): 7505.0, 2904.7, 7208.4, 6819.0, and 19500.0. Based on this information, which of the following statements is correct?

- a. An estimate of the average revenue for all *Fortune* 500 companies is 8787.42 (\$ millions).
- b. The average revenue for all *Fortune* 500 companies is 8787.42 (\$ millions).
- c. Over half of all *Fortune* 500 companies earn at least 7208.4 (\$ millions) in revenues.
- d. If five other *Fortune* 500 companies were chosen, the average revenue would be 8787.42 (\$ millions).

ANSWER: a

63. A sample of five *Fortune* 500 companies possessed the following industry codes: banking, banking, finance, retail, and banking. Based on this information, which of the following statements is correct?

- a. Sixty percent of the sample of five companies are banking industries.
- b. Sixty percent of all *Fortune* 500 companies are banking industries.
- c. Banking is the most common type of industry among all *Fortune* 500 companies.
- d. If five other *Fortune* 500 companies were chosen, 60% of them would be banking industries.

ANSWER: a

64. The Microsoft Office package used to perform statistical analysis is _____.

- a. SPSS
- b. Word
- c. SAS
- d. Excel

ANSWER: d

65. Dr. Kurt Thearling, a leading practitioner in the field, defines data mining as "the _____ extraction of _____ information from databases."

- a. thorough, insightful
- b. timely, accurate
- c. automated, predictive
- d. intentional, useful

ANSWER: c

66. The major applications of data mining have been made by companies with a strong focus on which of the following?

- a. Consumer
- b. Manufacturing
- c. Exporting
- d. Research and development

ANSWER: a

67. Quantitative data that measure "how many" versus quantitative data that measure "how much" are which types of data, respectively?

- a. Interval and ratio
- b. Ratio and interval

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- c. Continuous and discrete
- d. Discrete and continuous

ANSWER: d

68. Flight time from Cincinnati to Atlanta is an example of which type of variable and measurement, respectively?

- a. Discrete and interval
- b. Discrete and ratio
- c. Continuous and interval
- d. Continuous and ratio

ANSWER: d

69. Which of the following is NOT a categorical variable?

- a. Your age on your last birthday
- b. Your cell phone area code
- c. Your accounting class start time
- d. Your high school graduation year

ANSWER: a

70. Categorical data use which two scales of measurement?

- a. Nominal and ordinal
- b. Nominal and interval
- c. Ordinal and interval
- d. Interval and ratio

ANSWER: a

71. The term *data warehousing* is used to refer to the process of doing all of the following, except for which aspect of data?

- a. Capturing
- b. Storing
- c. Maintaining
- d. Mining

ANSWER: d

72. Which of the following is the process of using procedures from statistics and computer science to extract useful information from extremely large databases?

- a. Big data
- b. Analytics
- c. Data warehousing
- d. Data mining

ANSWER: d

73. Which type of data collection method gives the researcher the most control over variables of interest?

- a. Using existing data sources

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- b. Conducting an observational study
- c. Conducting a survey
- d. Conducting an experiment

ANSWER:

d

74. What can be inferred about the population of all lithium batteries produced with Rogers Industries' new solid-state technology based on the sample data showing an average battery life of 18.84 hours?

- a. The population average battery life is exactly 18.84 hours.
- b. The population average battery life is between 18.16 and 19.52 hours.
- c. The population average battery life could be more or less than 18.84 hours.
- d. The population average battery life is greater than 20 hours.

ANSWER:

c

75. A market research firm surveys consumers' likelihood of purchasing a new product. This type of data collection is best described as

- a. an observational study.
- b. an experiment.
- c. a census.
- d. using existing data sources.

ANSWER:

a

76. Based on a sample of 100 tablets showing an average battery life of 9.5 hours, what is a reasonable inference about the battery life for the population of all tablets of this model?

- a. The population average battery life is exactly 9.5 hours.
- b. The population average battery life is between 9.2 and 9.8 hours.
- c. The sample average provides an estimate of the population average battery life.
- d. The population average battery life must be greater than 10 hours.

ANSWER:

c

77. A manufacturing company conducts an experiment to evaluate how four different settings on a packaging machine affect the number of defective packages produced per hour. This type of data collection is best described as

- a. cross-sectional data collection.
- b. time series data collection.
- c. an observational study.
- d. an experiment.

ANSWER:

d

Subjective Short Answer

78. After the graduation ceremonies at a university, six graduates were asked whether they were in favor of (identified by 1) or against (identified by 0) abortion. Some characteristics of these graduates are shown below.

<u>Graduate</u>	<u>Sex</u>	<u>Age</u>	<u>Abortion Issue</u>	<u>Class Rank</u>
1	F	22	1	3
2	M	21	1	2

Name _____ Class _____ Date _____

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3	F	33	0	1
4	M	38	0	20
5	F	25	1	4
6	M	19	0	8

- How many elements are in the data set?
- How many variables are in the data set?
- How many observations are in the data set?
- Identify the scale of measurement for each of the above (Sex, Age, Abortion Issue, Class Rank).
- Which of the above (Sex, Age, Abortion Issue, Class Rank) are categorical, and which are quantitative variables?
- Are arithmetic operations appropriate for the variable "abortion issue"?

ANSWER:

- 6
- 4
- 6
- Sex: nominal
Age: ratio
Abortion Issue: nominal
Class Rank: ordinal
- Sex: categorical
Age: quantitative
Abortion Issue: categorical
Class Rank: categorical
- No

79. An issue of *Fortune Magazine* reported the following companies had the lowest sales per employee among the Fortune 500 companies.

<u>Company</u>	<u>Sales per Employee (\$ thousands)</u>	<u>Sales Rank</u>
Seagate Technology	42.20	285
SSMC	42.19	414
Russell	41.99	480
Maxxam	40.88	485
Dibrell Brothers	22.56	470

- How many elements are in the above data set?
- How many variables are in the above data set?
- How many observations are in the above data set?
- Name the scale of measurement for each of the variables.
- Name the variables and indicate whether they are categorical or quantitative.

ANSWER:

- 5
- 2

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- c. 5
- d. Sales per Employee: ratio; Sales Rank: ordinal
- e. Sales per Employee: quantitative; Sales Rank: categorical

80. The following shows the temperatures (high, low) and weather conditions on a given Sunday for seven world cities. For the weather conditions, the following notations are used: c = clear; cl = cloudy; sh = showers; pc = partly cloudy.

<u>City</u>	<u>Hi</u>	<u>Lo</u>	<u>Condition</u>
Acapulco	99	77	pc
Bangkok	92	78	pc
Mexico City	77	57	sh
Montreal	72	56	pc
Paris	77	58	c
Rome	88	68	cl
Toronto	78	61	c

- a. How many elements are in this data set?
- b. How many variables are in this data set?
- c. How many observations are in this data set?
- d. Name the scale of measurement for each of the variables.
- e. Name the variables and indicate whether they are categorical or quantitative.
- f. For which variables are arithmetic operations appropriate, and for which are they not appropriate?

ANSWER: a. 7
 b. 3
 c. 7
 d. Hi: interval, Lo: interval, Condition: nominal
 e. Hi: quantitative, Lo: quantitative, Condition: categorical
 f. Hi: appropriate, Lo: appropriate, Condition: not appropriate

81. A magazine surveyed a sample of its subscribers. Some of the responses from the survey are shown below.

<u>Subscriber ID</u>	<u>Sex</u>	<u>Age</u>	<u>Annual Household Income (\$1000s)</u>
0006	F	22	45
4798	M	21	53
2291	F	33	82
4988	M	38	30

- a. How many elements are in the data set?
- b. How many variables are in the data set?
- c. How many observations are in the data set?
- d. Name the scale of measurement for each of the variables.
- e. Which of the above (Sex, Age, Annual Household Income) are categorical, and which are quantitative?
- f. Are the data time series or cross-sectional?

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- ANSWER:
- 4
 - 3
 - 4
 - Sex: nominal, Age: ratio, Annual Household Income: ratio
 - Sex: categorical, Age: quantitative, Annual Household Income: quantitative
 - Cross-sectional

82. A magazine surveys a sample of its subscribers every year. Some of the responses are shown below.

<u>Year</u>	<u>Percent Female</u>	<u>Average Age</u>	<u>Average Annual Household Income (\$1000s)</u>
1996	5.8	35.2	40
1997	8.6	35.8	42
1998	7.3	33.9	41
1999	9.2	35.3	43
2000	9.8	36.6	46

- How many variables are in the data set?
- Name the scale of measurement for each variable.
- Which of the above (Year, Percent Female, Average Age, Average Annual Household Income) are categorical, and which are quantitative?
- Are the data time series or cross-sectional?

- ANSWER:
- 4
 - Year: interval, Percent Female: ratio, Average Age: ratio, Average Annual Household Income: ratio
 - All are quantitative
 - Time series

83. The following data show the yearly income distribution of a sample of 200 employees at MNM, Inc.

<u>Yearly Income (\$1000s)</u>	<u>Number of Employees</u>
20 – 24	2
25 – 29	48
30 – 34	60
35 – 39	80
40 – 44	10

- What percentage of employees have a yearly income of at least \$35,000?
- Is the figure (percentage) that you computed in Part a. an example of statistical inference? If not, what kind of statistics does it represent?
- Based on this sample, the president of the company said that "45% of all our employees' yearly incomes are at least \$35,000." The president's statement represents what kind of statistics?
- With the statement made in Part c., can we be assured that more than 45% of all employees' yearly incomes are at least \$35,000? Explain.
- What percentage of sample employees have a yearly income of less than \$30,000?
- How many variables are presented in the above data set?

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g. The above data set represents the results of how many observations?

- ANSWER:*
- a. 45%; 90 from income levels 35-39 and 40-44 out of the total of 200 employees.
 - b. No, it is descriptive statistics.
 - c. Statistical inference
 - d. No, this is simply an inference and approximation based on the sample information.
 - e. 25%; 50 from income 20-24 and 25-29 out of the total of 200 employees.
 - f. 1
 - g. 200

84. A recent issue of a national magazine reported that in a national public opinion survey conducted among 2,000 individuals, 56% were in favor of gun control, 40% opposed gun control, and 4% had no opinion on the subject.

- a. What is the sample in this survey?
- b. Based on the sample, what percentage of the population would you think is in favor of gun control?
- c. Based on the sample, what percentage of the population would you think have no opinion on the subject?

- ANSWER:*
- a. The 2,000 individuals who were approached
 - b. 56%
 - c. 4%

85. A pharmaceutical company is performing clinical trials on a new drug that is intended to relieve symptoms for allergy sufferers. Twelve percent of the 300 clinical trial participants experienced dry mouth as a side effect.

- a. What is the population being studied?
- b. What is the sample being studied?
- c. Based on the sample, what percentage of the population do you think would suffer from dry mouth?

- ANSWER:*
- a. All allergy sufferers
 - b. The 300 participants
 - c. 12%

86. A polling organization conducts a telephone poll of 850 registered voters and asks which candidate they will vote for in the upcoming presidential election. Forty-three percent of the respondents prefer candidate A and 45% prefer candidate B.

- a. What is the population being studied?
- b. What is the sample being studied?
- c. Based on the sample, what percentage of the population do you think would vote for candidate B?

- ANSWER:*
- a. All registered voters
 - b. The 850 registered voters who were polled

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c. 45%

87. The following table shows the starting salaries of a sample of recent business graduates.

<u>Income (\$1000s)</u>	<u>Number of Graduates</u>
45 – 49	40
50 – 54	60
55 – 59	80
60 – 64	18
65 – 69	2

- What percentage of graduates in the sample had starting salaries of at least \$60,000?
- Of the graduates in the sample, what percentage had starting salaries of less than \$55,000?
- Based on this sample, what percentage of all business graduates do you estimate to have starting salaries of at least \$50,000?

ANSWER:

- 10%; 20 from income levels 60-64 and 65-69 out of the total of 200 recent business graduates.
- 50%; 100 from income levels 45-49 and 50-54 out of the total of 200 recent business graduates.
- 80%; 160 from income levels 50-54, 55-59, 60-64 and 65-69 out of the total of 200 recent business graduates.

88. Michael, Inc., a manufacturer of electric guitars, is a small firm with 50 employees. The table below shows the hourly wage distribution of the employees.

<u>Hourly Wages (In Dollars)</u>	<u>Number of Employees</u>
10 – 13.99	8
14 – 17.99	12
18 – 21.99	20
22 – 25.99	10

- How many employees receive hourly wages of at least \$18?
- What percentage of the employees has hourly wages of at least \$18?
- What percentage of the employees has hourly wages of less than \$14?

ANSWER:

- 30; Add up the total of those that received hourly wages of 18-21.99 and 22-25.99
- 60%; Add up the total of those that received hourly wages of 18-21.99 and 22-25.99 and divide out the total of 50 survey employees.
- 16%; the total of those that received hourly wages of 10-13.99 divided out the total of 50 survey employees.

89. Laura Naples, manager of Heritage Inn, periodically collects and tabulates information about a sample of the hotel's overnight guests. This information aids her in planning and scheduling decisions she must make. The table below lists data on 10 randomly selected hotel registrants collected as the registrants checked out. The data listed for each registrant are: number of people in the group; birth date of person registering; shuttle service

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used, yes or no; total telephone charges incurred; and reason for stay, business or personal.

<u>ID of Registrant</u>	<u>Number of People in Group</u>	<u>Birth Date (mm/dd/yy)</u>	<u>Shuttle Used</u>	<u>Telephone Charges</u>	<u>Reason for Stay</u>
01	1	05/07/79	yes	\$ 0.00	personal
02	4	11/23/68	no	12.46	business
03	2	04/30/93	no	1.20	business
04	2	12/16/91	no	2.90	business
05	1	05/09/59	yes	0.00	personal
06	3	09/14/89	yes	4.65	business
07	2	04/22/86	no	9.35	personal
08	5	10/28/74	yes	2.10	personal
09	1	11/12/69	no	1.85	business
10	2	01/30/82	no	5.80	business

- How many elements are there in the data set?
- How many variables are there in the data set?
- How many observations are there in the data set?
- What are the observations for the second element listed?
- What is the total number of measurements in the data set?
- Which variables are quantitative?
- Which variables are qualitative?
- What is the scale of measurement for each of the variables?
- Does the data set represent cross-sectional or times series data?
- Does the data set represent an experimental or an observational study?

ANSWER:

- 10 elements
- 5 variables
- 10 observations
- 4, 11/23/68, no, 12.46, business
- 50
- People in group, telephone charges
- Birth date, shuttle used, reason for stay
- People in group – ratio scale, birth date – ordinal scale, shuttle use – nominal, telephone charge – ratio scale, reason for stay – nominal scale
- Cross-sectional
- Observational

90. Molly Porter owns and operates two convenience stores, one on the East side of the city and the other on the South side. She has workforce-planning decisions to make and has collected some recent sales data that are relevant to her decisions. Listed below are the monthly sales (\$1000s) at her two stores for the past six months.

<u>Store</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>
East	102	100	103	105	109	106
South	72	74	81	86	92	93

- Is the data set cross-sectional or time series data? Explain.
- Comment on any apparent patterns you see in the data.

ANSWER: a. Time series data because time series data is collected over a period of time.

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b. Both stores have been experiencing an overall rise in sales during the past six months. The South store's increase in sales (as a percentage of sales) has been greater than the East store's increase. The increases might be temporary, due to the seasonal nature of demand. It is also possible that the increases will continue.

91. The following table shows the starting salaries of a sample of recent VoTech graduates.

<u>Income (Rounded to \$1000s)</u>	<u>Number of Graduates</u>
35 – 39	40
40 – 44	60
45 – 49	80
50 – 54	18
55 – 59	2

- What percentage of graduates in the sample had starting salaries of at least \$50,000?
- Of the graduates in the sample, what percentage had starting salaries of less than \$45,000?
- Based on this sample, what percentage of all VoTech graduates do you estimate to have starting salaries of at least \$40,000?

ANSWER:

- 10%; 20 from income levels 50-54 and 55-59 out of the total of 200 recent VoTech graduates.
- 50%; 100 from income levels 35-39 and 40-44 out of the total of 200 recent VoTech graduates.
- 80%; 160 from income levels 40-44, 45-49, 50-54, and 55-59 out of the total of 200 recent VoTech graduates.

92. Suppose the current weather report for your area contains the following information. Specify the measurement scale for each of the variables.

- Temperature 84°
- Wind Speed 10 mph
- Wind Direction (from the) South
- Sky Description Sunny
- Molds Level High

ANSWER:

- Temperature – interval
- Wind Speed – ratio
- Wind Direction – nominal
- Sky Description – nominal
- Molds Level – ordinal