第一章 概论，
第二章 统计数据的来源及其质量

CHAPTER ONE
DATA AND STATISTICS

MULTIPLE CHOICE QUESTIONS

1. A survey to collect data on the entire population is
   a. a census
   b. a sample
   c. a population
   d. an inference
   Answer: a

2. In Excel, a worksheet that displays the data for the problem and shows the results of the analysis is
   a. a formula worksheet
   b. a value worksheet
   c. an absolute worksheet
   d. a descriptive worksheet
   Answer: b

3. In a questionnaire, respondents are asked to mark their gender as male or female. Gender is an example of the
   a. ordinal scale
   b. nominal scale
   c. ratio scale
   d. interval scale
   Answer: b

4. The nominal scale of measurement has the properties of the
   a. ordinal scale
   b. only interval scale
   c. ratio scale
   d. None of these alternatives is correct.
   Answer: d

5. The scale of measurement that is used to rank order the observation for a variable is called the
   a. ratio scale
   b. ordinal scale
   c. nominal scale
   d. interval scale
   Answer: b

6. Some hotels ask their guests to rate the hotel's services as excellent, very good, good, and poor. This is an example of the
   a. ordinal scale
   b. ratio scale
   c. nominal scale
   d. interval scale
   Answer: a

7. The ordinal scale of measurement has the properties of the
   a. ratio scale
   b. interval scale
   c. nominal scale
   d. ratio and interval scales
   Answer: c

8. The ratio scale of measurement has the properties of
   a. only the ordinal scale
   b. only the nominal scale
   c. the rank scale
   d. the interval scale
   Answer: d

9. Temperature is an example of a variable that uses
   a. the ratio scale
   b. the interval scale
   c. the ordinal scale
   d. either the ratio or the ordinal scale
   Answer: b

10. The interval scale of measurement has the properties of the
   a. ratio and nominal scales
   b. ratio and ordinal scales
   c. ratio scale
   d. None of these alternatives is correct.
   Answer: d

11. Arithmetic operations are inappropriate for
   a. the ratio scale
   b. the interval scale
   c. both the ratio and interval scales
   d. the nominal scale
   Answer: d

12. Income is an example of a variable that uses the
   a. ratio scale
   b. interval scale
   c. nominal scale
   d. ordinal scale
   Answer: a

13. Data obtained from a nominal scale
   a. must be alphabetic
   b. can be either numeric or nonnumeric
   c. must be numeric

d. must rank order the data
Answer: b

14. The scale of measurement that has an inherent zero value defined is the
a. ratio scale
b. nominal scale
c. ordinal scale
d. interval scale
Answer: a

15. Arithmetic operations are appropriate for
a. only the ratio scale
b. only the interval scale
c. the nominal scale
d. None of these alternatives is correct.
Answer: d

16. Quantitative data refers to data obtained with a(n)
a. ordinal scale
b. nominal scale
c. either interval or ratio scale
d. only interval scale
Answer: c

17. Data
a. are always be numeric
b. are always nonnumeric
c. are the raw material of statistics
d. None of these alternatives is correct.
Answer: c

18. The entities on which data are collected are
a. elements
b. populations
c. samples
d. None of these alternatives is correct.
Answer: a

19. The set of measurements collected for a particular element is (are) called
a. variables
b. observations
c. samples
d. None of these alternatives is correct.
Answer: b

20. A characteristic of interest for the elements is called a(n)
a. sample
b. data set
c. variable
d. None of these alternatives is correct.
Answer: c

21. All the data collected in a particular study are referred to as the

a. inference
b. variable
c. data set
d. None of these alternatives is correct.
Answer: c

22. Another name for "observations" is
a. views
b. variables
c. cases
d. None of these alternatives is correct.
Answer: c

23. Quantitative data
a. are always nonnumeric
b. may be either numeric or nonnumeric
c. are always numeric
d. None of these alternatives is correct.
Answer: c

24. In a questionnaire, respondents are asked to mark their gender as male or female. Gender is an example of a
a. qualitative variable
b. quantitative variable
c. qualitative or quantitative variable, depending on how the respondents answered the question
d. None of these alternatives is correct.
Answer: a

25. The number of cases will always be the same as the number of
a. variables
b. elements
c. data sets
d. data
Answer: b

26. Qualitative data
a. must be numeric
b. must be nonnumeric
c. cannot be numeric
d. may be either numeric or nonnumeric
Answer: d

27. Qualitative data
a. indicate either how much or how many
b. can not be numeric
c. are labels used to identify attributes of elements
d. must be nonnumeric
Answer: c

28. Ordinary arithmetic operations are meaningful
a. only with qualitative data
b. only with quantitative data
c. either with quantitative or qualitative data

d. None of these alternatives is correct.
Answer: b

29. Social security numbers consist of numeric values. Therefore, social security is an example of
a. a quantitative variable
b. either a quantitative or a qualitative variable
c. an exchange variable
d. a qualitative variable
Answer: d

30. Temperature is an example of
a. a qualitative variable
b. a quantitative variable
c. either a quantitative or qualitative variable
d. neither a quantitative nor qualitative variable
Answer: b

31. For ease of data entry into a university data - base, 1 denotes that the student is an undergraduate and 2 indicates that the student is a graduate student. In this case data are
a. qualitative
b. quantitative
c. either qualitative or quantitative
d. neither qualitative nor quantitative
Answer: a

32. Arithmetic operations are inappropriate for
a. qualitative data
b. quantitative data
c. both qualitative and quantitative data
d. large data sets
Answer: a

33. Income is an example of
a. qualitative data
b. either qualitative or quantitative data
c. dollar data
d. quantitative data
Answer: d

34. Data collected at the same, or approximately the same, point in time are
a. time series data
b. approximate time series data
c. crossectional data
d. approximate data
Answer: c

35. Data collected over several time periods are
a. time series data
b. time controlled data
c. crossectional data
d. time crossectional data
Answer: a

36. 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

37. Statistical studies in which researchers control variables of interest are
a. experimental studies
b. control observational studies
c. non-experimental studies
d. observational studies
Answer: a

38. 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

39. 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

40. The collection of all elements of interest in a particular study is
a. the population
b. the sampling
c. statistical inference
d. descriptive statistics
Answer: a

41. 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

42. In a sample of 800 students in a university, 240, or 30%, are Business majors. The 30% is an example of
a. a sample
b. a population
c. statistical inference
d. descriptive statistics
Answer: d

43. In a sample of 400 students in a university, 80, or 20%, are Business majors. Based on the above information, the school's paper reported that "20% of all the 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

44. Five hundred residents of a city are polled to obtain information on voting intentions in an upcoming city election. The five hundred residents in this study is an example of a(n)
a. census
b. sample
c. observation
d. population
Answer: b

45. A statistics professor asked students in a class their ages. On the basis of this information, the professor states that the average age of all the students in the university is 24 years. This is an example of
a. a census
b. descriptive statistics
c. an experiment
d. statistical inference
Answer: d

46. 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
d. an experiment
Answer: b

47. The Department of Transportation of a city has noted that on the average there are 17 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

Exhibit 1-1

In a recent study based upon an inspection of 200 homes in Daisy City, 80 were found to violate one or more city codes.

48. Refer to Exhibit 1-1. The city manager released a statement that 40% of Daisy City's 2,000 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

49. Refer to Exhibit 1-1. The Daisy City study described above is an example of the use of a
a. census
b. sample
c. probability
d. population
Answer: b

50. Refer to Exhibit 1-1. The manager's statement that 40% of Daisy City's 2,000 homes are in violation of city codes is
a. an exactly correct statement
b. only an approximation, since it is based upon sample information
c. obviously wrong, since it is based upon a study of only 200 homes
d. None of these alternatives is correct.
Answer: b

Exhibit 1-2

In a sample of 1,600 registered voters, 912, or 57%, approve of the way the President is doing his job.

51. Refer to Exhibit 1-2. The 57% approval is an example of
a. a sample
b. descriptive statistics
c. statistical inference
d. a population
Answer: b

52. Refer to Exhibit 1-2. A political pollster states: "Fifty-seven 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

53. The process of analyzing sample data in order 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

54. In a post office, the mailboxes are numbered from 1 to 4,500. These numbers represent
a. qualitative data
b. quantitative data
c. either qualitative or quantitative data
d. since the numbers are sequential, the data is quantitative
Answer: a

55. The average age in a **sample** of 190 students at City College is 22. As a result of this sample, it can be concluded that the average age of **all** the students at City College
a. must be more than 22, since the population is always larger than the sample

b. must be less than 22, since the sample is only a part of the population
c. could not be 22
d. could be larger, smaller, or equal to 22
Answer: d

56. Since a sample is a subset of the population, the sample mean
a. is always smaller than the mean of the population
b. is always larger than the mean of the population
c. must be equal to the mean of the population
d. can be larger, smaller, or equal to the mean of the population
Answer: d

57. The scale of measurement that is simply a label for the purpose of identifying the attribute of an element is the
a. ratio scale
b. nominal scale
c. ordinal scale
d. interval scale
Answer: b

58. In a data set, the number of elements will always be the same as the number of
a. independent variables
b. observations
c. data points
d. dependent variables
Answer: b

59. Which of the following is ***not*** a scale of measurement?
a nominal
b. ordinal
c. interval
d. primal
Answer: d

60. Which of the following is a scale of measurement?
a. ratio
b. primal
c. divisional
d. remedial
Answer a

61. Which scale of measurement can be either numeric or nonnumeric?
a. nominal
b. ratio
c. interval
d. None of these alternatives is correct.
Answer: a

62. Which of the following variables use the ratio scale of measurement?
a. social security number
b. temperature
c. gender
d. income

Answer: d

63. The weight of a candy bar in ounces is an example of
a. qualitative data
b. either qualitative or quantitative data
c. weight data
d. quantitative data
Answer: d

64. The height of a building, measured in feet, is an example of
a. qualitative data
b. either qualitative or quantitative data
c. feet data
d. quantitative data
Answer: d

65. An interviewer has made an error in recording the data. This type of error is known as
a. an experimental error
b. a data acquisition error
c. a non-experimental error
d. a conglomerate error
Answer: b

66. Census refers to
a. an experimental study to collect data on the entire population
b. an experimental study to collect data on a sample
c. a survey to collect data on a sample
d. a survey to collect data on the entire population
Answer: d

67. In experimental studies, the variable of interest
a. is not controlled
b. is controlled
c. must be numerical
d. cannot be numerical
Answer: b

68. In observational studies, the variable of interest
a. is not controlled
b. is controlled
c. must be numerical
d. cannot be numerical
Answer: a

69. In Excel, a worksheet that displays the formulas used to create the results is a
a. results worksheet
b. formula worksheet
c. value worksheet
d. sample worksheet
Answer: b

70. How many scales of measurement exist?
a. 1

b. 2
c. 3
d. 4
Answer: d

PROBLEMS

1. After 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 information about these graduates is shown below.

		Class		
Graduate	**Sex**	**Age**	**Abortion Issue**	**Rank**
Nancy	F	52	1	1
Michael	M	24	1	2
Tammy	F	33	0	4
Edward	M	38	0	20
Jennifer	F	25	1	3
Tim M	19	0	8	

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. Which of the above variables (Sex, Age, Abortion Issue, Class rank) are qualitative and which are quantitative variables?
e. Are arithmetic operations appropriate for the variable "abortion issue"?

Answers:

a. 6
b. 4
c. 6
d. Sex: qualitative
   Age: quantitative
   Abortion Issue: qualitative
   Class Rank: qualitative
e. No

2. A recent issue of Fortune Magazine reported that the following companies had the lowest sales per employee among the Fortune 500 companies.

	Sales per Employee	**Sales**
Company	**(In $1,000s)**	**Rank**
Seagate Technology	42.20	285
SSMC	42.19	414
Russel	41.99	480
Maxxam	40.88	485
Dibrell Brothers	22.56	470

a. How many elements are in the above data set?
b. How many variables are in the above data set?
c. How many observations are in the above data set?
d. Name the variables and indicate whether they are qualitative or quantitative.

Answers:

a. 5
b. 2
c. 5

d. Sales per employee: quantitative; Sales rank: qualitative

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

City	Hi	Lo	Condition
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 variables and indicate whether they are qualitative or quantitative.
e. For which variables are arithmetic operations appropriate and for which are they not appropriate?

Answers:
a. 7
b. 3
c. 7
d. Hi: quantitative, Lo: quantitative, Condition: qualitative
e. Hi: appropriate, Lo: appropriate, Condition: not appropriate

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

Yearly Income (In $1,000s)	Number of Employees
20 - 24	2
25 - 29	48
30 - 34	60
35 - 39	80
40 - 44	10

a. What percentage of employees has yearly incomes of more than $35,000?
b. Is the figure (percentage) that you computed in Part a an example of statistical inference? If no, what kind of statistics does it represent?
c. Based on this sample, the president of the company said that "45% of all our employees' yearly incomes are over $35,000." The president's statement represents what kind of statistics?
d. 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.
e. What percentage of employees of the sample has yearly incomes of $29,000 or less?
f. How many variables are presented in the above data set?
g. The above data set represents the results of how many observations?

Answers:

a. 45%
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%
f. 2
g. 200

5. 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?

Answers:

a. The 2000 individuals who were approached
b. 56%
c. 4%

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

Income (In $1,000s)	**Number of Graduates**
15 - 19	40
20 - 24	60
25 - 29	80
30 - 34	18
35 - 39	2

a. What percentage of graduates in the sample had starting salaries of at least $30,000?
b. Of the graduates in the sample, what percentage had starting salaries of less than $25,000?
c. Based on this sample, what percentage of all business graduates do you estimate to have starting salaries of at least $20,000?

Answers:

a. 10%
b. 50%
c. 80%

7. 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.

Hourly Wages (In Dollars)	**Number of Employees**
10 – 13	8

14 - 17	12
18 - 21	20
22 - 25	10

a. How many employees receive hourly wages of at least $18?
b. What percentage of the employees has hourly wages of at least $18?
c. What percentage of the employees has hourly wages of less than $14?

Answers:
a. 30
b. 60%
c. 16%

8. The following information regarding the top eight Fortune 500 companies was presented in a recent issue of *Fortune Magazine*.

Company	Sales $ Millions	Sales Rank	Profits $ Millions	Profits Rank
General Motors	161,315	1	2,956	30
Ford Motor	144,416	2	22,071	2
Wal-Mart Stores	139,208	3	4,430	14
Exxon	100,697	4	6,370	5
General Electric	100,469	5	9,269	3
Int'l Business Machines	81,667	6	6,328	6
Citigroup	76,431	7	5,807	8
Philip Morris	57,813	8	5,372	9
Boeing	56,154	9	1,120	82
AT&T	53,588	10	6,398	4

a. How many elements are in the above data set?
b. How many variables are in this data set?
c. How many observations are in this data set?
d. Which variables are qualitative and which are quantitative variables?
e. What measurement scale is used for each variable?

Answers:
a. 10
b. 4
c. 10
d. Sales and Profits are quantitative
   Sales Rank, and Profits Rank are qualitative
e. Sales: ratio
   Sales Rank: ordinal
   Profits: ratio
   Profits Rank: ordinal