1. Which of the following is an example of a discrete random variable?

a. The monthly electric bill for a local business.
b. The number of people eating at a local café between noon and 2:00 p.m.
c. The amount of time it takes for a worker to complete a complex task.
d. The percentage of people living below the poverty level in Boston.
e. The amount of money you spend on eating out each month.

2. What is the correct ranking of data from weakest or lowest level to strongest or highest level?

a. Nominal, ordinal, interval and ratio
b. Ordinal, nominal, interval and ratio
c. Interval, nominal, ratio and ordinal
d. Nominal, interval, ordinal, and ratio
e. Ratio, nominal, interval, and ordinal

3. Which of the following statements involve descriptive statistics as opposed to inferential statistics?

a. The Alcohol, Tobacco and Firearms Department reported that Seattle had 1,825 registered gun dealers in 2013.
b. Based on a survey of 380 magazine readers, the magazine reports that 30% of its readers prefer double column articles.
c. The FAA samples 425 traffic controllers in order to estimate the percent retiring due to job stress related illness.
d. Based on a sample of 350 professional baseball players, a baseball magazine reported that 23% of the parents of all professional baseball players did not play baseball.
e. The average weight of 200 students in a university to test the health department claim that the university students are over weight.

4. Which of the following statements is incorrect?

a. Ordinal data may be described as qualitative.
b. A categorical variable may produce ordinal data.
c. A discrete numerical variable may produce ratio scale data.
d. Nominal data may be described as quantitative.
e. Ratio level is the highest level of measurement.

5. The length of time it takes to assemble a particular electronic component varies from one employee to another. Management has collected the time (in minutes) it took 20 different employees to assemble the component. The information is summarized in the following frequency distribution generated by Excel:

Bin	*Frequency*	*Cumulative %*
10	1	5.00%
15	9	50.00%
20	1	55.00%
25	7	90.00%
More	2	100.00%

Which of the following statements is true?

a. 50% of all the workers took exactly 15 minutes to assemble the component.
b. 100% of all the workers took longer than 25 minutes to assemble the component.
c. Eleven workers assembled the component in 20 minutes or less.
d. Seven workers took 25 minutes or longer to assemble the component.
e. 10% of all the workers took exactly 10 minutes to assemble the component.

6. The table below is the data set of the Shiller Real Home Price Index for the years 1894-1904. Use a smoothing constant of $\alpha = 0.8$ to determine the forecasts using simple exponential smoothing.

Year	Real Home Price Index
1894	123.9804828
1895	117.4550916
1896	100.3029902
1897	106.5157028
1898	110.1841398
1899	103.8531133
1900	101.5742948
1901	87.3260955
1902	100.4736445
1903	93.07489238
1904	101.854359

What is the forecast for the year 1896?

a. 106.01
b. 109.35
c. 103.89
d. 104.95
e. 106.52

7. Suppose you are told that the mean of a sample is below the median. What does this information suggest about the distribution?

   a. The distribution is skewed to the left or negatively skewed.
   b. The distribution is symmetric.
   c. The distribution is skewed to the right or positively skewed.
   d. There is insufficient information to determine the shape of the distribution.
   e. The distribution is normally distributed.

8. Which of the following descriptive statistics is least affected by outliers?

a. Mean
b. Range
c. Median
d. Standard deviation
e. Coefficient of variation

9. Suppose you are told that the average return on investment for a particular class of investments was 7.8% with a standard deviation of 2.3. Furthermore, the histogram of the distribution of returns is approximately bell-shaped. We would expect that 95 percent of all of these investments had a return between what two values?

a. 5.5% and 10.1%
b. 0% and 15%
c. 0.9% and 10.1%
d. 3.2% and 12.4%
e. 0.9% and 14.7%

10. The police lieutenant in charge of the traffic division has reviewed the number of traffic citations issued per day by each of the 10 police officers in his division. The data were: 13, 21, 12, 34, 31, 13, 22, 26, 25, and 23. The mean and the first quartile of the number of citations issued per day respectively are:

a. 13 and 13.5
b. 22 and 13
c. 22.5 and 27.25
d. 22.5 and 13
e. 13.5 and 27.25

11. The probability that interest rates on housing loans will go up in the next 6 months is estimated to be 0.20. The probability that house sales will decrease is estimated to be 0.6. The probability that interest rates will go up and house sales will decrease is estimated to be 0.15. The probability that house sales will go down given that interest rates will go up is:

a. 0.95
b. 0.90
c. 0.80
d. 0.85
e. 0.75

12. A survey of executives revealed that 35% of them regularly read The Wall Street Journal, 20% read Forbes, and 10% read both The Wall Street Journal and Forbes. What is the probability that a particular executive reads either The Wall Street Journal or Forbes?

a. 0.35
b. 0.55
c. 0.65
d. 0.70
e. 0.45

13. On average, you receive 2.6 pieces of junk mail a day. Assume that the number of pieces of junk mail you receive each day follows the Poisson distribution. What is the probability of receiving more than three pieces of junk mail today?

a. 0.123
b. 0.482
c. 0.264
d. 0.242
e. 0.736

14. Consider the following probability distribution. Which of the following is true?

x	0	1	2	3	4	5	6	7
$P(x)$	0.05	0.16	0.19	0.24	0.18	0.11	0.05	0.02

a. $P(2 < X < 5) = 0.42$
b. $P(X > 6) = 0.07$
c. $P(X \geq 3) = 0.64$
d. $P(X \leq 6) = 0.93$
e. $P(2 < X < 5) = 0.72$

15. A company hires management trainees for entry level sales positions. Past experience indicates that only 10% will still be employed at the end of 9 months. Assume the company recently hired 6 trainees. What is the probability that at least two of the trainees will still be employed at the end of 9 months?

a. 0.9841
b. 0.0984
c. 0.1143
d. 0.0159
e. 0.8857

16. The finishing process on new furniture leaves slight blemishes. The table below displays a manager's probability assessment of the number of blemishes in the finish of new furniture.

Number of Blemishes	0	1	2	3	4	5
Probability	0.34	0.25	0.19	0.11	0.07	0.04

On average, how many defects would we expect on a piece of furniture?

a. 0.28
b. 0.85
c. 1.44
d. 0.77
e. 4.12

17. Over the past 10 years, the return on Stock A has averaged 8.4% with a standard deviation of 2.1%. The return on Stock B has averaged 3.6% with a standard deviation of 0.9%. Which of the following statements is true?

a. Stock A has smaller relative variation than Stock B.
b. Stock B has smaller relative variation than Stock A.
c. Unable to tell with the given information.
d. Both stocks have bell shape distribution.
e. Both stocks exhibit the same relative variation.

18. The number of orders that come into a mail-order sales office each month is normally distributed with a mean of 298 and a standard deviation of 15.4. What is the probability that in a particular month the office receives more than 310 orders?

a. 0.7823
b. 0.2826
c. 0.7174
d. 0.2177
e. 0.2542

19. The number of orders that come into a mail-order sales office each month is normally distributed with a mean of 298 and a standard deviation of 15.4. The probability is 0.3 that the sales office receives less than how many orders?

a. 310.9
b. 290.0
c. 285.1
d. 306.0
e. 300.0

20. Checkout times in a grocery store follow the exponential distribution with a mean time of 6.5 minutes. What is the probability that the checkout time (T) for the next customer will be less than 5 minutes?
    a. 0.463
    b. 0.257
    c. 0.950
    d. 0.537
    e. 0.743

21. The amount of time that you have to wait before seeing the doctor in the doctor's office is normally distributed with a mean of 15.2 minutes and a standard deviation of 15.2 minutes. If you take a random sample of 35 patients, what is the probability that the average wait time is greater than 20 minutes? *(Hint: Round the probability value to 2 decimal places.)*

a. 0.28
b. 0.03
c. 0.16
d. 0.09
e. 0.84

22. What type of graph does a stem-and-leaf resemble when turned vertically?
    a. Pie chart
    b. Scatter plot
    c. Line chart
    d. Box plot
    e. Histogram

23. A company has developed a new battery, but the average lifetime is unknown. In order to estimate this average, a sample of 110 batteries is tested and the average lifetime of this sample is found to be 200 hours. The 200 hours is the value of a:

a. Parameter.
b. Statistic.
c. Sampling frame.
d. Population.
e. Sample

24. The number of television sets produced from an assembly line each day is known to have a standard deviation of 17.4 sets per day. The production line averaged 452.3 sets per day for 20 randomly selected days. Which of the following represents a 95% confidence interval for the population mean number of sets per hour?

a. 452.3 ± 9.4
b. 452.3 ± 11.3
c. 452.3 ± 7.63
d. 452.3 ± 13.8
e. 452.3 ± 8.39

THE NEXT THREE QUESTIONS ARE BASED ON THE FOLLOWING INFORMATION:

The sales representative for a manufacturer of a new product claims that the product will increase output per machine by at least 29 units per hour. A line manager installs the product on 15 of the machines, and finds that the average increase was only 26 with a standard deviation of 6.2.

25. What are the appropriate null and alternative hypotheses?

a. $H_0: \mu = 29 \; H_1: \mu \neq 29$
b. $H_0: \mu = 29 \; H_1: \mu > 29$
c. $H_0: \mu > 29 \; H_1: \mu \leq 29$
d. $H_0: \mu = 29 \; H_1: \mu \leq 29$
e. $H_0: \mu \geq 29 \; H_1: \mu < 29$

26. Using a 5% significance level, which of the following statements is true?

a. Reject H_0 if *t* statistic < 1.771.
b. Reject H_0 if *t* statistic > 2.16.
c. Reject H_0 if *t* statistic < -1.761.
d. Reject H_0 if *t* statistic < -2.16.
e. Reject H_0 if *t* statistic > 1.761.

27. The value of the test statistic is

a. 1.240
b. 1.874
c. -1.240
d. -1.874
e. -1.761

28. In a recent survey of 600 adults, 16.4% indicated that they had fallen asleep in front of the television in the past month. Which of the following intervals represents a 98% confidence interval for the population proportion?

a. 0.137 to 0.192
b. 0.140 to 0.189
c. 0.143 to 0.186
d. 0.115 to 0.176
e. 0.129 to 0.199

29. A car insurance company performed a study to determine whether an association exists between age of driver and the frequency of car accidents. They obtained the following sample data.

		Under 25	**25 – 45**	**Over 45**
Number of accidents in past three years	0 or 1	84	93	96
	More than 1	16	7	4

At 5% level of significant, to determine whether an association exists between age of driver and the frequency of car accidents the test statistic and critical value respectively are:

a. χ^2_{stat} = 8.6843, and $\chi^2_{critical\ value}$ = 5.991
b. χ^2_{stat} = 10.7329, and $\chi^2_{critical\ value}$ = 7.3778
c. χ^2_{stat} = 7.8835, and $\chi^2_{critical\ value}$ = 5.991
d. χ^2_{stat} = 9.5238, and $\chi^2_{critical\ value}$ = 5.991
e. χ^2_{stat} = 12.5617, and $\chi^2_{critical\ value}$ = 3.8415

30. One of the major automobile makers has developed two new engines. The manager collect the following information's:

	Engine I	**Engine II**
Sample size	7	9
Sample mean	28.7	33.4
Sample standard deviation	3.4	4.12

At 5% significant level, to test the hypothesis that there is a difference between the mean miles per gallon. Assuming equal population variances the test statistic is

a. -2.4363
b. 2.4363
c. 2.2078
d. -2.2078
e. 3.3945

THE NEXT TWO QUESTIONS ARE BASED ON THE FOLLOWING INFORMATION:
Suppose two food preservatives are extensively tested and determined safe for use in meats. A processor wants to compare the preservatives for their effects on retarding spoilage. Suppose 16 cuts of fresh meat are treated with preservative *A* and another 12 cuts of meat are treated with preservative *B*. The number of hours until spoilage begins is recorded for each of the 28 cuts of meat. The results are summarized in the table below.

	Preservative *A*	Preservative *B*
Sample means	95.25	100.50
Sample standard deviation	13.45	10.55

31. The value of the test statistic for determining if there is a difference in the population variances for preservatives *A* and *B* is equal to:

a. 0.784.
b. 1.625.
c. 1.275.
d. 1.129.
e. 2.9

32. What assumptions are necessary for a comparison of the population variances to be valid?

a. Both sampled populations are normally distributed.
b. At least one of the population variances is known.
c. The samples are correlated.
d. One of the samples follows normal distribution and the other follows *F* distribution.
e. The sample variances are equal.

Next two questions are related to the following statement

The manager of a used-car dealership is very interested in the resale price of used cars. The manager feels that the age of the car is important in determining the resale value. He collects data on the age and resale value of 15 cars and runs a regression analysis with the value of the car (in thousands of dollars) as the dependent variable and the age of the car (in years) as the independent variable. Unfortunately, the printout had lost some of the results, identified by "*A*" through "*F*". The partial results left are displayed below.

33. Find these lost values of "*A"* through "*C"* in the following tables.

34. Find these lost values of "*D"* through "*F"* in the following table.

Regression Statistics	
Multiple R	0.442
R Square	"*A*"----------
Adjusted R Square	0.133
Standard Error	"*B*"----------
Observations	15.000

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	44.397	44.397	3.154	0.09914
Residual	13	"*C*"----------	14.076		
Total	14	227.389			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	"*D*"----------	3.835	5.988	0.000
Age	"*E*"----------	0.640	–1.776	"*F*"---------

THE NEXT TWO QUESTIONS ARE BASED ON THE FOLLOWING INFORMATION:

A Sample of size 25 firms was selected from the industry to examine the relationship between Turnover Rate (in %) and 3 variables:

X1: Innovative index (higher scores indicate a more innovative and creative organizational culture), X2: Job Growth rate (in %). X3: number of employees.

35. Using the following MINITAB output, Complete the following ANOVA table.

Predictor	Coef	SE Coef	T	P
Constant	9.2439	0.78710	11.74	0.000
X1	-0.0240	0.01524	-1.58	0.134
X2	-0.5013	0.07287	-6.88	0.000
X3	0.0006	0.00055	1.13	0.276

Standard error of the estimate = 0.74

Analysis of Variance

Source	DF	SS	MS	F
Regression	-----	-------	-------	-------
Residual Error	-----	-------	-------	
Total	-----	211.818		

36. What is the proportion of variation in the Turnover Rate can be explained by these independent variables?
    a. 0.999
    b. 0.548
    c. 0.956
    d. 0.884
    e. 0.627

Next two questions are related to the following statement

The following table contains the number of complaints received in a department store for the first 6 months of last year.

Month	Complaints
January	36
February	45
March	81
April	90
May	108
June	144

37. If a three-term moving average is used to smooth this series, what would be the first calculated term?
    a. 64
    b. 24
    c. 114
    d. 54
    e. 84

38. If a five-term moving average is used to smooth this series, what would be the last calculated term?
    a. 86.4
    b. 94.5
    c. 89.5
    d. 90.6
    e. 93.6

Next two questions are related to the following statement

The office manager of Arapaho Valley Pediatrics Clinic examined prices of six items the clinic uses as part of its operation. Shown below are the items, their prices, and the quantities for the years 2010 and 2011.

	2010		2011	
Item	Price	Quantity	Price	Quantity
Syringes (dozen)	6.70	150	6.95	135
Cotton swabs (box)	1.35	60	1.45	65
Patient record forms (pad)	5.10	8	6.25	12
Children's Tylenol (bottle)	4.50	25	4.95	30
Computer paper (box)	11.95	6	13.20	8
Thermometers	7.90	4	9.00	2
Totals	37.50		41.80	

39. What is the unweighted aggregate price index for 2011 with a base year of 2010?
    a. 106.1
    b. 1418.45
    c. 105.6
    d. 111.5
    e. 1379.60

40. Compute the Paasche Index number for 2011 using 2010 as the base year.
    a. 111.5
    b. 105.6
    c. 110.8
    d. 103.5
    e. 106.1