

**Sample Final****MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.****Questions 1-4**The following is a set of data from a sample of size  $n(n=6)$ : 10, 17, -2, 10, 23, 26.

- 1) Find the mean of the data set  
A) 15                                      B) 14                                      C) 10                                      D) 13.5
- 2) Find the standard deviation of the data set  
A) 9.33                                      B) 522.00                                      C) 104.40                                      D) 10.22
- 3) The five-number summary of the data set consists of \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.  
A) -2, 7, 13.5, 23.75, 26                      B) -2, 1.75, 3.5, 5.25, 26                      C) -2, 12, 4, 6, 26                      D) -2, 10, 13.5, 23, 26
- 4) Based on the boxplot, the distribution shape of the data set is  
A) normal                                      B) bell-shape                                      C) left-skewed                                      D) right-skewed

**Question 5-7:** The owner of a local nightclub has recently surveyed a random sampled of 81 customers of the club with:  $\bar{X} = 21.73$ ,  $s = 2.8$ . She would like to determine whether or not the mean age of her customers is over 21.

- 5) Give the null and alternative hypotheses.  
A)  $H_0: \bar{X} \leq 21.73$  and  $H_1: \bar{X} > 21.73$                       B)  $H_0: \mu = 21$  and  $H_1: \mu \neq 21$   
C)  $H_0: \mu \leq 21$  and  $H_1: \mu > 21$                       D)  $H_0: \mu \geq 21$  and  $H_1: \mu < 21$
- 6) Using the sample information provided, calculate the value of the test statistic.  
A)  $t = (21.73 - 21.00) / (2.8/9)$                       B)  $t = (21.73 - 21.00) / (2.8/9^2)$   
C)  $t = (21.73 - 21.00) / 2.8$                       D)  $t = (21.00 - 21.73) / (2.8/9)$
- 7) Suppose  $\alpha = 0.005$ . Which of the following is correct?  
A) At  $\alpha = 0.005$ , we fail to reject  $H_0$ .                      B) At  $\alpha = 0.005$ , we accept the data.  
C) No decision should be make                      D) At  $\alpha = 0.005$ , we reject  $H_0$ .

**Question 8-9:** The following table contains the number of employees of a company over the last five year.

| Year | Number of employees |
|------|---------------------|
| 1999 | 35                  |
| 2000 | 40                  |
| 2001 | 45                  |
| 2002 | 40                  |
| 2003 | 38                  |

- 8) If a three-term moving average is used for forecasting, what is the forecasting for year 2003?  
A) 38                                      B) 40                                      C) 41.67                                      D) 41
- 9) If we want to obtain the exponential smoothing time-series for forecasting, what would be the value of  $F_4$  (use  $a=0.4$ )?  
A) 40.2                                      B) 45                                      C) 37                                      D) 41.8
- 10) Based on the definition, a wavelike pattern describing a gradual ups and downs movement that is generally apparent over a year would be considered as the \_\_\_\_\_ pattern.  
A) cyclical                                      B) seasonal                                      C) trend                                      D) horizontal



**Question 17-19:** The weight of apples is normally distributed with a mean of 5.5 ounces and a standard deviation of 1.2 ounces. A random sample of 36 apples is taken and put in a box.

- 17) What is the probability that the sample mean will be between 5.0 ounces and 5.5 ounces?  
 A) -2.5000                      B) 0.0062                      C) 0.5000                      D) 0.4938
- 18) What is the probability that the sample mean will be above 6 ounces?  
 A) 2.5000                      B) 0.5000                      C) 0.0062                      D) 0.9938
- 19) Below what value do 11.7% of the sample means fall?  
 A) 5.738                      B) 5.477                      C) 5.262                      D) 5.523

**Questions 20-21:** A quality control analyst for a lightbulb manufacturer is concerned that the time it takes to produce a batch of lightbulbs is too erratic. Accordingly, the analyst randomly surveys 4 production periods each day for 8 days and records the sample mean and range for each day.

| Day    | $\bar{X}$ (in minutes) | R    |
|--------|------------------------|------|
| 1      | 15.1                   | 3.5  |
| 2      | 14.3                   | 4.1  |
| 3      | 15.3                   | 3.3  |
| 4      | 12.6                   | 2.8  |
| 5      | 11.8                   | 3.7  |
| 6      | 12.9                   | 4.8  |
| 7      | 17.3                   | 4.5  |
| 8      | 13.9                   | 2.9  |
| Total: | 113.2                  | 29.6 |

- 20) Referring to the table, suppose the analyst constructs an  $\bar{X}$  chart to see if the production process is in-control. What is the Upper control limit (UCL) and the lower control limit (LCL) for this chart?  
 A) 7.93 and 0                      B) 15.53 and 12.77                      C) 8.44 and 0                      D) 16.85 and 11.45
- 21) Referring to the table, suppose the analyst constructs an  $\bar{X}$  chart to see if the production process is in-control. Which expression best describes this chart?  
 A) decreasing trend                      B) in-control  
 C) increasing trend                      D) at least one point is outside of the control limits.
- 22) A department store is interested in determining the proportion of the customers who buy sleeping pills. It's found that out of a randomly selected 200 customers, 27 buy sleeping pills. Use a 90% confidence interval to estimate the true proportion of customers who buy sleeping pills.  
 A)  $0.135 \pm 0.047$                       B)  $0.135 \pm 0.040$                       C)  $0.135 \pm 0.036$                       D)  $0.135 \pm 0.014$
- 23) A department store is interested in determining the proportion the customers who buy sleeping pills. It's found that out of a randomly selected 200 customers, 27 buy sleeping pills. The 99% confidence interval for p is  $0.135 \pm 0.062$ . Interpret this interval.  
 A) We are 99% confident that 13.5% of the customers are on some sort sleeping pills.  
 B) We are 99% confident that the true proportion of the customers buying sleeping pills is between 7.3% and 19.7%.  
 C) We are 99% confident that 7.3% and 19.7% of the sampled customers buying sleeping pills.  
 D) 99% of the customers buy between 7.3% and 19.7% of the sleeping pills.

- 24) An investigator is interested in estimating the average weekly income of restaurant waiters and waitresses in a large city. Thirty-one restaurant workers were randomly sampled and analyzed with the following results:  $\bar{X} = \$225$  and  $s^2 = 225$ . Construct a 95% confidence interval for the mean.
- A)  $\$225 \pm \$5.50$                       B)  $\$225 \pm \$5.28$                       C)  $\$225 \pm \$54.95$                       D)  $\$225 \pm \$4.57$

**Question 25–28:** The managers of a brokerage firm are interested in finding out if the number of new clients a broker brings into the firm affects the sales generated by the broker. They sample 20 brokers and determine the number of new clients they have enrolled in the last year and their sales amounts in thousands of dollars. These data are partially presented in the table with the following results:  $\hat{Y}_i = 30.5 + 2.25X_i$ ,  $SST=2530.5$ ,  $SSR=2320.3$ , and  $\sum(X_i - \bar{X})^2 = 150.5$ .

| Broker | Clients (X) | Sales (Y) |
|--------|-------------|-----------|
| 1      | 27          | 82        |
| :      | :           | :         |
| 20     | 22          | 72        |

- 25) Which of the following statements is correct for interpreting the meaning of the slope  $b_1$  ?
- A) For each increase of one additional new client, we can expect a increase of an estimated amount of 30.5 (in \$1,000s) in sales.  
 B) For each increase of one unit in sales, we can expect an increase of an average of 2.25 new clientin.  
 C) For each increase of one unit in sales, we can expect a increase of an average of 30.5 new clientin.  
 D) For each increase of one additional new client, we can expect an increase of an estimated amount of 2.25 (in \$1,000s) in sales.
- 26) Which of the following statements is correct for the coefficient of determination?
- A) 91.69% of the variation in sales can be explained by the number of new clients brought in.  
 B) 95.75% of the variation in sales can be explained by the number of new clients brought in.  
 C) 91.69% of the variation in new clients can be explained by the number of sales.  
 D) 95.75% of the variation in new clients can be explained by the number of sales.
- 27) The managers of the brokerage firm wanted to test if there is a linear relationship. The value of the test statistic is \_\_\_\_\_.
- A) 3.417                                      B) 8.078                                      C) 5.742                                      D) 6.296
- 28) Suppose the managers of the brokerage firm want to obtain a 90% confidence interval estimate for the mean sales made by brokers who have brought into the firm 20 new clients. Using  $\bar{X}=25.0$ , the confidence interval is from \_\_\_\_\_ to \_\_\_\_\_.
- A) 62.31 to 84.85                      B) 72.75 to 78.26                      C) 70.76 to 75.81                      D) 60.67 to 84.47

**Question 29–30:** It is said that 75% of all big businesses in the United States have a web site. Suppose five big businesses are selected randomly.

- 29) What is the probability that at least two of them have a web site?
- A) 0.999                                      B) 0.001                                      C) 0.015                                      D) 0.9844
- 30) The average number of big businesses you should expect to have a web site is
- A) 3.25                                      B) 37.5                                      C) 3.75                                      D) 3.00
- 31) The average number of e-mails received per week is an example of \_\_\_\_\_ random variable.
- A) discrete                                      B) parameter                                      C) continuous                                      D) categorical

**Question 32-35:** A prediction model for the selling price (in thousands) of a house is to be developed. It's believed that the selling price is influenced by the assessed values ( $X_1$ , Assessed, in thousands) of the house, the amount of time it took the house to sell ( $X_2$ , Time, in months) and whether the house is a new house or an old house ( $X_3$ , New, with New=0 for a new house and New=1 an old house). Twenty-five houses are randomly selected and the Microsoft Excel output is provided below:

|           | <i>Coefficients</i> | <i>Standard Error</i> | <i>t Stat</i> | <i>P-value</i> |
|-----------|---------------------|-----------------------|---------------|----------------|
| Intercept | 30.946              | 2.7038                | 11.446        | 1.19E-11       |
| Assessed  | 0.5173              | 0.0283                | 18.299        | 2.26E-16       |
| Time      | -0.1644             | 0.0720                | -2.284        | 0.0308         |
| New       | -1.0965             | 0.6888                | -1.592        | 0.1235         |

- 32) Which of the following equations is the correct multiple regression equation for the data?
- A)  $\hat{Y}_i = 30.946 + 0.5173X_{1i} + 0.1644X_{2i} - 1.0965X_{3i}$       B)  $\hat{Y}_i = 30.946 + 0.5173X_{1i} - 0.1644X_{2i} - 1.0965$   
C)  $\hat{Y}_i = 30.946 + 0.5173X_{1i} - 0.1644X_{2i} + 1.0965X_{3i}$       D)  $\hat{Y}_i = 30.946 + 0.5173X_{1i} - 0.1644X_{2i} - 1.0965X_{3i}$
- 33) What is the predicted selling price (in thousands) of a new house that took 10 months to sell and which is assessed at \$120,000 ?
- A) 91.38                                      B) 90.28                                      C) 120.00                                      D) 85.35
- 34) At the 0.01 level of significance, what conclusion should we draw regarding the inclusion of Time in the regression model ?
- A) The Time variable is not significant in explaining the selling price and should not be included in the model because its  $p$  value is less than 0.01.  
B) The Time variable is not significant in explaining the selling price and should not be included in the model because its  $p$  value is more than 0.01.  
C) The Time variable is significant in explaining the selling price and should be included in the model because its  $p$  value is less than 0.01.  
D) The Time variable is significant in explaining the selling price and should be included in the model because its  $p$  value is more than 0.01.
- 35) The 95% confidence interval estimate for the slope of the Time variable is \_\_\_\_\_ to \_\_\_\_\_.
- A) -0.439 to -0.0596                      B) -0.3141 to -0.0147                      C) -0.0147 to 0.3141                      D) -0.2172 to -0.1820

**Question 36:** Mothers Against Drunk Driving is a very visible group whose main focus is to educate the public about the harm caused by drunk drivers. A study was recently done that emphasized the problem we all face with drinking and driving. Four hundred accidents that occurred on a Saturday night were analyzed. Two items noted were the number of vehicles involved and whether alcohol played a role in the accident. The numbers are shown below:

| Did alcohol play a role? | Number of Vehicles |     |    | Totals |
|--------------------------|--------------------|-----|----|--------|
|                          | 1                  | 2   | 3  |        |
| Yes                      | 50                 | 100 | 20 | 170    |
| No                       | 25                 | 175 | 30 | 230    |
| Totals                   | 75                 | 275 | 50 | 400    |

- 36) Referring to the table, what proportion of accidents involved alcohol or 3 vehicles?
- A) 50/400                                      B) 200/400                                      C) 20/400                                      D) 170/400

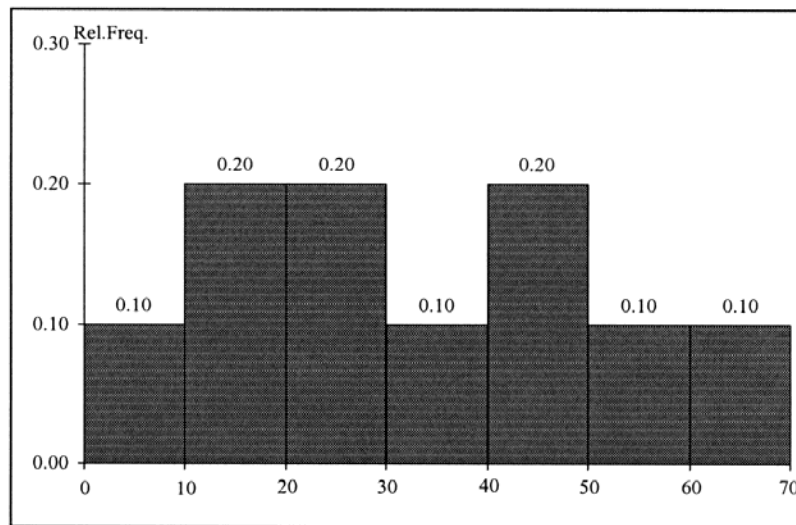
- 37) When testing  $H_0 : \mu_1 - \mu_2 = 0$  versus  $H_1 : \mu_1 - \mu_2 \neq 0$ , the test statistic was found to be  $-2.13$ . Suppose  $\alpha = 0.025$ , which of the following is correct ?
- A) with  $p\text{-value}=0.0332$ , we fail to reject  $H_0$                       B) with  $p\text{-value}=0.9834$ , we fail to reject  $H_0$   
 C) with  $p\text{-value}=0.9668$ , we fail to reject  $H_0$                       D) with  $p\text{-value}=0.0166$ , we reject  $H_0$

A survey was conducted to determine how people rated the quality of programming available on television. Respondents were asked to rate the overall quality from 0 (no quality at all) to 100 (extremely good quality). The stem-and-leaf display of the data is shown below.

| Stem | Leaves |
|------|--------|
| 3    | 24     |
| 4    | 034789 |
| 5    | 01123  |
| 6    | 125667 |
| 7    | 01     |
| 8    | 67     |
| 9    | 24     |

- 38) what percentage of the respondents rated overall television quality with a rating of 70 or **above**?
- A) 80%                      B) 20%                      C) 24%                      D) 70%

The histogram below represents scores achieved by 200 job applicants on a personality profile.



- 39) Referring to the histogram, 30% of the job applicants scored **below** \_\_\_\_\_ .
- A) 50                      B) 30                      C) 20                      D) 40
- 40) According to the empirical rule, if the data form a "bell-shaped" normal distribution, \_\_\_\_\_ percent of the observations will be contained within 2 standard deviations around the mean.
- A) 68.26                      B) 99.70                      C) 95.44                      D) 93.75
- 41) Indicate the measurement scale of the following variable: the number of books purchased.
- A) ratio                      B) ordinal                      C) interval                      D) nominal

**Question 42-44**

The following table contains the probability distribution for  $X$  = the number of weekly sales of a particular photocopying machine.

|        |      |      |      |      |      |
|--------|------|------|------|------|------|
| $X$    | 0    | 1    | 2    | 3    | 4    |
| $f(X)$ | 0.10 | 0.10 | 0.05 | 0.20 | 0.55 |

- 42) Referring to the table, the probability of at least two machine being sold is \_\_\_\_\_.
- A) 0.90                                      B) 0.80                                      C) 0.75                                      D) 0.20
- 43) Referring to the table, the mean or expected value for the number of sales for a given week is \_\_\_\_\_.
- A) 1.0    B) 2.0    C) 3.0    D) 1.5
- 44) Referring to the table, the standard deviation of the number of sales is \_\_\_\_\_.
- A) 2.00    B) 1.90    C) 3.00    D) 1.38

Answer Key

Testname: SAMPLE\_FINAL.TST

**MULTIPLE CHOICE.** Choose the one alternative that best completes the statement or answers the question.

- 1) B
- 2) D
- 3) A
- 4) C
- 5) C
- 6) A
- 7) A
- 8) C
- 9) A
- 10) A
- 11) B
- 12) D
- 13) B
- 14) A
- 15) D
- 16) B
- 17) D
- 18) C
- 19) C
- 20) D
- 21) D
- 22) B
- 23) B
- 24) A
- 25) D
- 26) A
- 27) B
- 28) B
- 29) D
- 30) C
- 31) C
- 32) D
- 33) A
- 34) B
- 35) B
- 36) B
- 37) A
- 38) C
- 39) C
- 40) C
- 41) A
- 42) B
- 43) C
- 44) D