Sample Exam 3

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

Question 1–7: 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 12 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: SST=1564.2, SSR=1227.4, $\sum(X_i - \overline{X})^2 = 979.7$ and $\hat{Y} = 17.7 + 1.12X$.

Broker	Clients (X)	Sales (Y)
1	27	52
2	11	37
:	:	:
12	22	38

1) Interpret the meaning of the slope b_1. That is, for each increase of one addittional new client,

    A) we can expect a decrease of an estimated amount of 1.12 (in $1,000s) in sales

    B) we can expect a decrease of an estimated amount of 1.12 in the clints

    C) we can expect a increase of an estimated amount of 1.12 in the clints

    D) we can expect a increase of an estimated amount of 1.12 (in $1,000s) in sales

2) The prediction for the amount of sales (in $1,000s) for a person who brings 23 new clients into the firm is _____.

    A) 44.58   B) 17.70   C) 43.46   D) 45.70

3) Which of the following statement is correct for the coefficient of determination?

    A) 88.58% of the variation in new clients can be explained by the number of sales.

    B) 78.47% of the variation in sales can be explained by the number of new clients brought in.

    C) 78.47% of the variation of the variation in new clients can be explained by the number of sales.

    D) 88.58% of the variation in sales can be explained by the number of new clients brought in.

4) The managers of the brokerage firm wanted to test the significance of the linear relationship between X and Y. The value of the test statistic is _____.

    A) 5.376   B) 3.412   C) 1.931   D) 6.041

5) For a test with $\alpha = 0.05$, which of the following represents the result of the relevant hypothesis test?

    A) can't find the level of significance   B) reject H_0

    C) no decision   D) fail to reject H_0

6) The 95% confidence interval estimate for the slope is _____ to _____.

    A) 0.532 to 1.708   B) 0.471 to 1.932   C) 0.856 to 1.636   D) 0.707 to 1.533

7) Suppose the managers of the brokerage firm want to obtain a 95% confidence interval estimate for the mean sales made by brokers who have brought into the firm 23 new clients. Using $\overline{X}$=25.08, the confidence interval is from _____ to _____.

    A) 38.23 to 49.93   B) 18.23 to 57.42   C) 39.63 to 47.29   D) 30.76 to 55. 81

Question 8–9: Use the sample data below to test the hypotheses

   H0: p1 = p2 =p3
   H1: Not all population proportionsare equal

Response	1	2	3	Totals
Yes	20	44	50	114
No	30	26	30	86
Totals	50	70	80	200

8) What is the test statistic ?

   A) 7.863   B) 8.082   C) 10.005   D) 6.615

9) To perform a chi–square test using a level of significance of 0.01. what decision should you make?

   A) No decision.   B) Can't find α.   C) Reject H0.   D) Fail to reject H0.

Question 10–16: A prediction model for the selling price (Y, in thousands) of a house is to be developed. It's believed that the selling price is influenced by the assessed values (X1, denoted as Assessed, in thousands) of the house, the amount of time it took the house to sell (X2, denoted as Time, in months) and whether the house is a new house or an old house (X3, denoted as New, in particular, we set X3=0 for a new house and X3=1 for an old house). 20 houses are randomly selected and the computer output is provided below:

	Coefficients	Standard Error	t Stat	P–value
Intercept	33.946	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

10) Which of the following equation is the correct multiple regression equation for the data?

   A) $\hat{Y}_i$ =33.946+0.5173X_{1i} – 0.1644X_{2i} –1.0965X_{3i} B) $\hat{Y}_i$ =33.946+0.5173X_{1i} – 0.1644X_{2i} +1.0965X_{3i}

   C) $\hat{Y}_i$ =33.946+0.5173X_{1i} + 0.1644X_{2i} –1.0965X_{3i} D) $\hat{Y}_i$ =33.946+0.5173X_{1i} – 0.1644X_{2i} –1.0965

11) What is the predicted selling price (in thousands) of a new house that took 15 months to sell and is assessed at $70,000 ?

   A) 36242.480   B) 36241.384   C) 66.595   D) 67.691

12) If the computer output for the coefficient of multiple determination is .9228. Which of the following statement is correct?

   A) 92.28% of the variability in Time can be explained by Assessed, selling price, and New.

   B) 92.28% of the variability in the selling price can be explained by Assessed, Time, and New.

   C) 96.06% of the variability in the selling price can be explained by Assessed, Time, and New.

   D) 7.72% of the variability in the selling price can be explained by Assessed, Time, and New.

13) The 90% confidence interval estimate for the slope for New variable is _____ to _____.

   A) –2.2682 to 0.0752   B) –3.1083 to 0.9154   C) –1.061 to 2.2991   D) –2.2991 to 0.1061

14) Suppose we want to test whether the coefficient on Time is significantly different from 0. What is the value of the relevant test statistic t_{cal}?

   A) –2.284   B) 18.299   C) 0.0308   D) –1.592

15) At the 0.1 level of significance, what conclusion should we draw regarding the inclusion of Time in the regression model ?

    A) Time is not significant in explaining the selling price and should not be included in the model because its p value is more than 0.1.

    B) Time is significant in explaining the selling price and should be included in the model because its p value is less than 0.1.

    C) Time is not significant in explaining the selling price and should not be included in the model because its p value is less than 0.1.

    D) Time is significant in explaining the selling price and should be included in the model because its p value is more than 0.1.

16) Which of the following best represents the interpretation of the slope b_2 ?

    A) For a unit increase in the Price, the selling time will decrease by 0.1644 on average if Assesses and New are held constant.

    B) For each one-month increase in the selling time, the Price will decrease by –0.1644 on average if Assessed and New are held constant.

    C) For each one-month increase in the selling time, the Price will decrease by 0.1644 on average if Assessed and New are held constant.

    D) For each one-month increase in the selling time, the Price will decrease by 0.1644 on average.

Questions 17–20: A quality control analyst for a lightbulb manufacturer is concerned that the time it takes to produce a batch of lightbulbs is too erratic. Thus, he/she randomly surveys 4 production periods each day for 10 days with the record:

Day	$\overline{X}$ (in minutes)	R
1	23.4	6.8
2	29.7	7.3
3	22.6	5.4
4	19.7	4.9
5	18.6	7.5
6	25.2	6.9
7	17.9	7.4
8	21.4	8.6
9	22.8	9.4
10	20.3	6.7
Total	221.6	70.9

17) Referring to the table, suppose the analyst constructs an R chart to see if the variability in production times is in-control. What is the upper control limit (UCL) for this R chart?

    A) 14.21   B) 16.41   C) 12.60   D) 16.18

18) Referring to the table, suppose the analyst constructs an R chart to see if the variability in production times is in-control. What is the lower control limit (LCL) for this R chart?

    A) 0.00   B) 0.52   C) 1.58   D) 7.09

19) Referring to the table, suppose the analyst constructs an $\overline{X}$ 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) 25.58 and 18.74   B) 27.33 and 16.99   C) 24.34 and 19.98   D) 22.16 and 7.09

20) Referring to the table, which expression best describes this chart?

    A) at least one point is outside of the control limits.   B) increasing trend

    C) decreasing trend   D) in-control

Question 21–23: A manufacturer of computer disks took samples of 200 disks on 5 consecutive days. The number of disks with bad sectors was determined for each of these samples. The results are in the table that follows.

Day	Sample Size	Bad
1	200	41
2	200	26
3	200	32
4	200	28
5	200	39

21) The p control chart is to be made for these data. The proportion (center line) of the control chart is _____ .

    A) 0.332   B) 166.000   C) 0.166   D) 0.830

22) The p control chart is to be made for these data. The upper control limit is _____ , and the lower control limit is _____ .

    A) 0.223; 0.067   B) 0.192; 0.140   C) 0.245; 0.087   D) 0.277; 0.055

23) Referring to the table, suppose, which expression best describes this chart?

    A) a decreasing trend is detected   B) the process is in–control

    C) at leaset one point is outside of the control limits   D) a increasing trend is detected

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

1) D
2) C
3) B
4) D
5) B
6) D
7) C
8) A
9) D
10) A
11) D
12) B
13) D
14) A
15) B
16) C
17) D
18) A
19) B
20) A
21) C
22) C
23) B