King Fahd University of Petroleum and Minerals
Department of Mathematics
Stat 212
Final Exam
221
January 02, 2023
Net Time Allowed: 120 Minutes

MASTER VERSION

1. We have created a 95% confidence interval for μ with the result $(10, 15)$. What decision will be make if we test $H_0 : \mu \leq 11$ against $H_1 : \mu > 11$ at $\alpha = 0.05$?

   (a) We cannot tell what our decision will be from the information given. —(correct)

   (b) Reject H_0 in favor of H_1 at the 5% level.

   (c) Accept H_0 against H_1.

   (d) Fail to reject H_0 in favor of H_1 at the 10% level.

   (e) Reject H_0 in favor of H_1 at the 10% level.

2. The telephone company wanted to test that the percentage of customers, that would consider purchasing an additional telephone line if it were made available at a substantially reduced installation cost, is not higher than 20%. What statement represents committing type II error in this context?

   (a) Concluding that there is no evidence that the percentage of customers, that would consider purchasing an additional telephone line if it were made available at a substantially reduced installation cost, is more than 20% but, in fact it is above 20%. ——————————————————————(correct)

   (b) Concluding that there is evidence that the percentage of customers, that would consider purchasing an additional telephone line if it were made available at a substantially reduced installation cost, is above 20% but, in fact it is lower than 20%.

   (c) Concluding that there is no evidence that the percentage of customers, that would consider purchasing an additional telephone line if it were made available at a substantially reduced cost, installation is lower than 20% but, in fact it is lower than 20%.

   (d) Concluding that there is evidence that the percentage of customers, that would consider purchasing and additional telephone line if it were made available at a substantially reduced installation cost, is above 20% but, in fact it is above 20%.

   (e) Concluding that there is evidence that the percentage of customers, that would consider purchasing and additional telephone line if it were made available at a substantially reduced installation cost, is below 20% but, in fact it is above 20%.

3. A study is conducted to test whether there is a significant difference in the scores of male and female students for a STATS course. A sample of 25 *males* has a mean = 72 and a standard deviation=9. A sample of 15 *females* has a mean = 75 and a standard deviation = 7. Based on these information and assuming *unequal* population variances, what is the absolute value of the test statistic?

   (a) 1.176 (correct)

   (b) 1.472

   (c) 4.399

   (d) 2.1

   (e) 1.562

4. A study is conducted to test whether there is a significant difference in the scores of male and female students for a STATS course. A sample of 25 *males* has a mean = 72 and a standard deviation = 9. A sample of 15 *females* has a mean = 75 and a standard deviation = 7. Based on these information and assuming *unequal* population variances, what this the p-value for testing $H_0 : \mu_M - \mu_F \geq 0$ against $H_1 : \mu_M - \mu_F < 0$?

   (a) $0.1 < p$-value < 0.25 (correct)

   (b) $0.05 < p$-value < 0.1

   (c) $0.025 < p$-value < 0.05

   (d) $0.01 < p$-value < 0.025

   (e) $0.005 < p$-value < 0.01

5. **(Use Data 1)** The manufacturer wanted to test that if the population standard deviation has increased above $1.2°F$. At 0.05 level of significance what is/are the **critical value/s**?

   (a) 42.557 _____ (correct)

   (b) 42.557 & 17.708

   (c) 17.708

   (d) 43.773

   (e) 16.047 & 45.722

6. **(Use Data 1)** The manufacturer wanted to test that if the population standard deviation has increased above $1.2°F$. At 0.05 level of significance what is the **decision of the test**?

   (a) There is evidence that the population standard deviation is above $1.2°F$. (correct)

   (b) There is no evidence that the population standard deviation is above $1.2°F$.

   (c) There is evidence that the population standard deviation is $1.2°F$.

   (d) . There is evidence that the population standard deviation is below $1.2°F$.

   (e) There is no evidence that the population standard deviation is $1.2°F$.

7. We are interested to fit a line for predicting the scores of students using the study time. In theory, which way should the line slope?

   (a) The slope of the line should be positive because there is a direct relationship between the two variables. (correct)

   (b) The slope of the line should be negative because there is a direct relationship between the two variables.

   (c) The slope of the line should be positive because there is an inverse relationship between the two variables.

   (d) The slope of the line should be negative because there is an inverse relationship between the two variables.

   (e) The slope of the line should be negative because there is strong relationship between the two variables.

8. **(Use Data 2)** Calculate the strength of the linear association between the Rainfall and the number of Umbrellas sold.

   (a) 0.451 (correct)

   (b) -0.451

   (c) -0.627

   (d) 0.627

   (e) 0.0086

9. **(Use Data 2)** If you want to predict the number of Umbrellas sold using the Rainfall, calculate the percentage of variation in the number of Umbrellas sold that is explained by the variation in the Rainfall.

   (a) 20.3 _____ (correct)
   (b) -45.1
   (c) -62.7
   (d) 45.1
   (e) 67.2

10. The summary of data on birth rate (births per 10,000 population) and GNP (gross national product per capita cross times 10 to the power of negative 3 end exponent) of 14 developing countries is given below:

$$\sum x = 17.05, \quad \sum x^2 = 41.22, \quad \sum y = 55, \quad \sum xy = 52.37$$

    Fit a linear regression line to predict the birth rate. The **slope** of the estimated regression line is found to be

   (a) -0.714 _____ (correct)
   (b) -0.627
   (c) 0.627
   (d) 0.860
   (e) 4.779

11. **(Use Data 3)** The standard error of the estimate is:

(a) 69.8867 (correct)
(b) 67.4337
(c) 256.7801
(d) 72.6284
(e) 65.1044

12. **(Use Data 3)** The percentage of the variation in the appraised value that is explained by the variation in both the house size and the number of rooms **adjusted** to the given sample size and the number of predictors used, is:

(a) 66.30% (correct)
(b) 0.386
(c) 72.81
(d) 6.56
(e) 4.21

13. **(Use Data 3)** To test whether the number of rooms is significant to predict the appraised value, given that the house size is included in the model, at the 5% significance level, the **test statistics** is:

    (a) 10.42 (correct)
    (b) 0.386
    (c) 72.81
    (d) 6.56
    (e) 4.21

14. **(Use Data 3)** To test whether the number of rooms is significant to predict the appraised value, given that the house size is included in the model, at the 5% significance level, the **critical value** is:

    (a) 4.21 (correct)
    (b) 5.01
    (c) 5.25
    (d) 4.75
    (e) 5.63

15. **(Use Data 4)** Which two **predictors** have the highest correlation coefficient?

(a) Total labor and Total staff. (correct)
(b) Total labor and Dubner.
(c) Total staff and Dubner.
(d) Remote and Total staff.
(e) Total labor and Remote.

16. **(Use Data 4)** What is Variance inflationary factor of Total staff?

(a) 1.7099 (correct)
(b) 1.23
(c) 1.46
(d) 1.999
(e) 0.2365

17. **(Use Data 4)** Which predictor has the highest **variance inflationary factor**?

(a) Total Labor _____(correct)
(b) Total staff
(c) Stand by hours
(d) Dubner
(e) Remote

18. **(Use Data 5)** Using R^2_{adj}, the model that should be taken into consideration contains:

(a) 5 variables _____(correct)
(b) 1 variable
(c) 3 variables
(d) 4 variables
(e) 6 variables

19. **(Use Data 5)** Using C_p, the model that should be taken into consideration contains:

(a) 5 variables _____(correct)
(b) 1 variable
(c) 3 variables
(d) 4 variables
(e) 6 variables

20. **(Use Data 6)** If a three-month moving average is used to smooth this series, what would be the second calculated value?

(a) 1.53 billion _____(correct)
(b) 1.52 billion
(c) 1.46 billion
(d) 1.42 billion
(e) 1.6 billion

21. **(Use Data 6)** What is your exponential smoothed forecast for 2003, given that the smoothing coefficient $w = 0.25$?

    (a) 1.49 (correct)
    (b) 1.48
    (c) 1.47
    (d) 1.46
    (e) 1.50

22. In forecasting a quarterly time series over the five-year period from the first quarter of 2006 through the fourth quarter of 2010, the exponential trend forecasting equation is given by

$$\log_{10} Y_i = 3.0 + 0.1X_i - 0.25Q_1 + 0.20Q_2 + 0.15Q_3$$

    where quarter zero is the first quarter of 2006. Take the antilog of the appropriate coefficient from this equation. What is the fitted value of the series in the fourth quarter of 2008?

    (a) 12589.25 (correct)
    (b) 15848.93
    (c) 10000
    (d) 4.1
    (e) 4.3

23. **(Use Data 7)** Calculate the unweighted aggregate price index for 2015, using 1995 as the base year.

    (a) 186.96 (correct)
    (b) 53.49
    (c) 154.42
    (d) 64.76
    (e) 123.56

24. **(Use Data 7)** Calculate the Paasche aggregate price index for 2015, using 1995 as the base year.

    (a) 154.42 (correct)
    (b) 186.96
    (c) 53.49
    (d) 64.76
    (e) 220.34