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(Knowledge for Development)

KIBABII UNIVERSITY
UNIVERSITY EXAMINATIONS
2015/2016 ACADEMIC YEAR
THIRD YEAR SECOND SEMESTER
MAIN EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
MATHEMATICS

COURSE CODE: STA 348

COURSE TITLE: STATISTICAL COMPUTING

DATE: 29/4/16

TIME: 8.00-10.00 A.M.

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

This Paper Consists of 5 Printed Pages. Please Turn Over.

Question one

- (a) List with details ,three compulsory and five optional requirements in creating a data file
- (b) Income can be measured on several levels. Describe how income could be measured as an ordinal, interval and ratio measure.
- (c) Enumerate 4 ways in which SPSS can transform data
- (d) A function Y is given by $y = \sin(x)$ and another function z is given by $z = \cos(x)$

Write m.scripts that can be executed in MATLAB to generate corresponding sine and cosine waves respectively (12 marks).

Question two

A matrix B is given by $B = [1,4,3,2; 2,1,3,2; 1,2,3,4; 5,2,1,4]$

- (a). Describe how you can extract a 2×2 matrix from the third row and second column (4 marks).
- (b). Explain how you can determine Mean, Standard Deviation of the first two columns of matrix B (6 marks)
- (c). The correlation coefficients of rows and columns in matrix B can be given by:

| | | | |
|---------|---------|---------|---------|
| 1.0000 | -0.3149 | -0.9685 | 0.4575 |
| -0.3149 | 1.0000 | 0.1325 | -0.2294 |
| -0.9685 | 0.1325 | 1.0000 | -0.5774 |
| 0.4575 | -0.2294 | -0.5774 | 1.0000 |

- (i) . Describe how you can generate such correlation coefficients from matrix B using a MATLAB command .Explain statistical interpretations and importance of three sets of columns whose correlation coefficients are 1,0 and -1 respectively (10 marks)

Question three

a) Suppose you have the following Research Question

- To what extent does weight of a car in pounds predict miles per gallon in a U.S. dataset of 398 models of cars?

- Are the two variables discrete or continuous?
- Are the two variables nominal, ordinal, interval or ratio scales?
- Which statistical procedure could we use to test the research question?
- What is the null hypothesis?
- What is your expectation?

b) The regression SPSS output of the above question was as below. Use it to answer the following questions

Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .807 ^a | .651 | .650 | 4.622 |

a. Predictors: (Constant), Vehicle Weight (lbs.)

ANOVA^b

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|-----|-------------|---------|-------------------|
| 1 | Regression | 15794.632 | 1 | 15794.632 | 739.503 | .000 ^a |
| | Residual | 8457.943 | 396 | 21.358 | | |
| | Total | 24252.575 | 397 | | | |

a. Predictors: (Constant), Vehicle Weight (lbs.)

b. Dependent Variable: Miles per Gallon

Coefficients^a

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|-------|-----------------------|-----------------------------|------------|---------------------------|---------|------|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 45.492 | .841 | | 54.110 | .000 |
| | Vehicle Weight (lbs.) | -.007 | .000 | -.807 | -27.194 | .000 |

a. Dependent Variable: Miles per Gallon

- i) How much variance in Miles Per Gallon is explained by Car Weight?
- ii) Is this variance explained significantly different to 0?
- iii) What is the constant
- iv) What is the slope?
- v) Is the slope statistically significant?
- vi) Write out the model regression equation
- vii) What is the standardised regression coefficient for vehicle weight?
- viii) If a car weighed 1000 pounds, what would be the predicted miles per gallon?
- ix) What is the standard error of the estimate?
- x) What would be the approximate 95% confidence interval of our prediction

Question four

ANOVA

Age of Respondent

| | Sum of Squares | df | Mean Square | F | Sig. |
|----------------|----------------|------|-------------|-------|------|
| Between Groups | 2784.189 | 2 | 1392.095 | 4.409 | .012 |
| Within Groups | 477048.215 | 1511 | 315.717 | | |
| Total | 479832.404 | 1513 | | | |

Multiple Comparisons

Dependent Variable: Age of Respondent

LSD

| (I) Race of Respondent | (J) Race of Respondent | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval | |
|------------------------|------------------------|-----------------------|------------|------|-------------------------|-------------|
| | | | | | Lower Bound | Upper Bound |
| | | | | | | |

| | | | | | | |
|-------|-------|---------|-------|------|--------|-------|
| White | Black | 2.930* | 1.344 | .029 | .29 | 5.57 |
| | Other | 5.609* | 2.587 | .030 | .53 | 10.68 |
| Black | White | -2.930* | 1.344 | .029 | -5.57 | -.29 |
| | Other | 2.679 | 2.828 | .344 | -2.87 | 8.23 |
| Other | White | -5.609* | 2.587 | .030 | -10.68 | -.53 |
| | Black | -2.679 | 2.828 | .344 | -8.23 | 2.87 |

*. The mean difference is significant at the 0.05 level.

Consider the SPSS output above

- (a) State the Procedure for one-way between-groups ANOVA with post-hoc tests
- (b) Explain the interpretation of output from one-way between-groups ANOVA with post-hoc tests

Question five

A market researcher is interested in the coffee drinking habits of males and females. He asks a sample of male and female office workers to record the number of cups of coffee they consume during a week.

- a) Which parametric statistical technique could the researcher use to determine if males and females differ in terms of the number of cups of coffee consumed in a week? Justify your answer and describe how you would obtain this statistic using SPSS.
- b) What are the key values you would look for in the output?
- c) What assumptions should you check for when using the technique that you chose in question (a), above.
- d) What non-parametric technique could be used to address this research question?