# MACHAKOS UNIVERSITY

**University Examinations for 2016/2017 Academic Year**

**SCHOOL OF BUSINESS AND ECONOMICS**

**DEPARMENT OF ECONOMICS**

**FOURTH YEAR FIRST SEMESTER EXAM FOR BACHELOR OF COMMERCE (FINANCE OPTION)**

**BMS 404: ECONOMETRIC MODELING AND METHODS**

**DATE: 3/8/2017** **TIME: 2:00 – 4:00 AM**

**INSTRUCTIONS**

i. **Answer Question one and any other two questions**
ii. **Do not write on the question paper**
iii. **Show your workings clearly**

**QUESTION ONE (COMPULSORY) (30 MARKS)**

a) What is a model? (2 marks)
b) Discuss the crucial features of a good model. (5 marks)
c) List down the criteria for evaluating validity of a model (5 marks)
d) Distinguish between correlation and regression analysis. (3 marks)
e) How are mathematical models superior to graphical models? (3 marks)
f) Why is making assumptions or the classic simple phrase "ceteris paribus" an important component of economic modeling? (2 marks)
g) The aggregate demand and aggregate supply (AD-AS) is a powerful framework in analysis of economic cycles
   i. Draw the AD-AS framework (2 marks)
   ii. What assumptions are made under the AD-AS model? (2 marks)
   iii. Identify variables that can be used in applied AD-AS framework (3 marks)
   iv. Explain examples of graphical models (3 marks)

**QUESTION TWO (20 MARKS)**

a) You were conducting a study on the age at first birth bycomparing gender of respondents (young parents). This is a mean difference analysis. Answer the following questions:

i) Which are the two groups that comprise your unit of analysis? (2 marks)

ii) Given your objective, describe the data you must gather and how you would go about it (4 marks)

iii) Which is the most appropriate test statistic applicable in this study? (2 marks)

b) Suppose you used SPSS statistical software an derived the following output. Use the results to answer the following questions

**Group Statistics**

| | R'S SEX | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| R'S AGE WHEN 1ST CHILD BORN | MALE | 788 | 25.39 | 5.527 | .197 |
| | FEMALE | 1167 | 22.74 | 4.990 | .146 |

**Independent Samples Test**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| R'S AGE WHEN 1ST CHILD BORN | Equal variances assumed | 7.630 | .006 | 10.988 | 1953 | .000 | 2.641 | .240 | 2.170 | 3.113 |
| | Equal variances not assumed | | | 10.773 | 1570.438 | .000 | 2.641 | .245 | 2.160 | 3.122 |

What is the sample size for both males and females? Justify your answer. (2 marks)

i) How old is the average male at first birth? (1 mark)

ii) How old is the average female at first birth? (1 marks)

iii) What is the mean age difference between males and females at first birth? (2 marks)

iv) Is the mean age difference between males and females at first birth statistically significant? Support your answer . (3 marks)

v) If you were to make a policy recommendation on development interventions based on your findings, what would it be? (3 marks)

**QUESTION THREE (20 MARKS)**

a) Stata is one of the most versatile modeling software used by economists. It is a command based application with built in data sets which one can use to practice their expertise. Identify the commands and describe the approach you would use to do these tasks:

i) Open the 1978 Automobile data (1 mark)

ii) Obtain summary descriptive statistics for all variables (1 mark)

iii) Obtain summary descriptive statistics "price", "weight" and "gear ratio" (1 mark)

iv) Determine a scatter plot for "mpg" and "weight" (1 mark)

v) Create a correlation matrix of " mpg" and "weight" (1 mark)

b) A student established the following ANOVA F-statistic having cross-tabulated "foreign" and "weight":**Pearson $\chi^2$ (63) = 62.0332 Pr = 0.511**

i) What do you think the student was interested in doing? (2 marks)

ii) State the null and alternative hypotheses (Ho and Ha) of the test? (4 marks)

iii) How would the student have proceeded to test the null hypothesis given the results? (6 marks)

iv) State the conclusion about the relationship between foreign and weight. (3 marks)

**QUESTION FOUR (20 MARKS)**

a) What is an identity? (2 marks)

b) The Keynesian national income model is described as follows:

Y=C+I+G+X-M

C= a + b (Y-T)

T= $\alpha$ + $\beta$ Y

M= $\sigma$ + $\rho$ Y

I=I, G=G and X=X

(i) Derive the solution to this model (3 marks)

(ii) You are provided with the following scenario analysis:

| | **a** | **b** | $\alpha$ | $\beta$ | **I** | **G** | **X** | $\sigma$ | $\rho$ | **Y*** | $\Delta$ **Y*** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Initial values | 200 | 0.8 | 100 | 0.5 | 80 | 40 | 50 | 60 | 0.2 | i | - |
| 10% increase in a | ii | 0.8 | 100 | 0.5 | 80 | 40 | 50 | 60 | 0.2 | iii | iv |
| 40% increase in $\beta$ | 200 | 0.8 | 100 | v | 80 | 40 | 50 | 60 | 0.2 | vi | vii |
| h% increase in G | 200 | 0.8 | 100 | 0.5 | 80 | 80 | 50 | 60 | 0.2 | viii | ix |
| 20% increase in Y* | 200 | 0.8 | 100 | 0.5 | x | 40 | 50 | 60 | 0.2 | xi | xii |

Obtain values "h" and "i – xii" (7 marks)

(iii) Demonstrate how you could have used MS Excel spreadsheet to perform the scenario analysis. (10 marks)

**QUESTION FIVE (20 MARKS)**

a) Make short notes on when it becomes necessary to use the following analytical techniquesor statistical tests in research:

i) One sample t-test (2 marks)

ii) F-statistic (2 marks)

iii) Correlation coefficient (2 marks)

iv)Chi-square statistic (2 marks)

v) Coefficient of determination (2 marks)

b) The following regression output was produced by an analysis of **mpg** against **weight** in the **Automobile** dataset in Stata.

```
      Source |       SS       df       MS              Number of obs =      74
-------------+------------------------------           F(  1,    72) =  134.62
       Model |   1591.9902     1   1591.9902           Prob> F       =  0.0000
    Residual |  851.469256    72  11.8259619           R-squared     =  0.6515
-------------+------------------------------           Adj R-squared =  0.6467
       Total |      a      73  33.4720474           Root MSE      =  3.4389
------------------------------------------------------------------------------
mpg |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
weight |  -.0060087   .0005179   -11.60   0.000    -.0070411   -.0049763
       _cons |   39.44028   1.614003    b      0.000     36.22283    42.65774
------------------------------------------------------------------------------
```

i) How many observations comprise the dataset? (1 mark)

ii) In the regression equation "$mpg = \alpha + \beta weight$", determine the parameters $\alpha$ and $\beta$ from the linear regression output. Interpret them appropriately. (4 marks)

iii) Explain the meaning of $\alpha$ and $\beta$ in the equation. (2 marks)

iv) What does the statistic $F(1,72)=134.62$, $p \leq 0.01$ tell us? (2 marks)

v) Why is it better to report the adjusted R-squared rather than R-squared? (1 mark)