KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2017/2018

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF THE BACHELOR OF ECONOMICS AND FINANCE, BACHELOR OF ECONOMICS AND STATISTICS

EES 400: FUNDAMENTALS OFECONOMETRICS

DATE: Thursday 8th February 2018 **TIME: 11:00 a.m.– 1:00 p.m.**

Answer question ONE and any other TWO

QUESTION ONE (30 MARKS)

a) State the Gauss Markov theorem. (2marks)

b) Highlight any two problems that are likely to arise from the violation of one or more of the basic ordinary least squares assumptions. (2marks)

c) Explain the role of disturbance term in econometric model. (3marks)

d) Outline any three uses of econometric research methodology. (3marks)

e) Explain the steps that constitute an econometric research methodology (4marks)

f) A researcher is attempting to estimate the mean μ of some population. He is able to observe a single observation drawn randomly from each of two random variables X_1 and X_2. It is known that both variables have an expected value equal to μ. It is also known that the variance of X_2 is five times that of X_1. In order to estimate μ the researcher decides to use a statistic which is a weighted average of the observed values of X_1 and X_2, i.e. he uses an estimator of the form: $\hat{O} = WX_1 + (1 - W)X_2$

Where W lies between zero and one inclusive.

i) Show whether : $\hat{O}$ is an unbiased estimator for μ (4marks)

ii) Let δ^2 represent the value of X_1. Find in terms of w and δ^2, an expression for the variance of $\hat{O}$. (6marks)

iii) Using your answer in part (ii), find the value of W the researcher should choose in order for $\hat{O}$ to have the smallest variance possible. (4marks)

iv) What does it mean to say that an estimator is consistent. (2marks)

QUESTION TWO

Discuss the problems associated with the use of R^2 in judging the performance of a single equation, or as a basis of comparison of different equations (4marks)

The following table gives data on the assessed value of houses (Y), size of dwelling (X_1) and the age of the house (X_2)

House	**Assessed value (Tens of thousands)**	**Size of Dwelling (Thousands of square feet)**	**Age (Years)**
1	84.4	2.00	3.42
2	77.4	1.71	11.50
3	75.7	1.45	8.33
4	85.9	1.76	0.00
5	79.1	1.93	7.42
6	70.4	1.20	32.00
7	75.8	1.55	16.00
8	85.9	1.93	2.00
9	78.5	1.59	1.75
10	79.2	1.50	2.75
11	86.7	1.90	0.00
12	79.3	1.39	0.00
13	74.5	1.54	12.58
14	83.8	1.89	2.75
15	76.8	1.59	7.17

Required:

i) Compute ordinary least squares (OLS) estimates for the regression (6marks)

ii) Interpret your results in (i) (2marks)

iii) Predict the assessed value for a house that has a size of 1750 square feet and is 10 years old (2marks)

iv) Stating the null and alternate hypothesis, test at 5% level of significance the overall significance of the OLS regression model estimated above (6marks)
$(F_{tab} = 3.89)$

QUESTION THREE

a) Define multicollinearity (1mark)

b) Explain the consequences of multicollinearity on the following:

i) Goodness of fit (2marks)

ii) Hypothesis testing (2marks)

iii) Confidence intervals (2marks)

c) An ANOVA table for a certain three variable regression Y, X1, X2 and 30 observations is given as shown below ($F_{tab} = 3.35$)

Source of variation	SS	Df	MSS	F- ratio
Regression	20029.84	B	e	G
Residuals	12691.54	C	f	
Total	a	D		

Required:

i) Find the values of a, b, c, d, e, f and g (7marks)

ii) Calculate the adjusted R^2 and interpret the results (3marks)

iii) Use the ANOVA table to test for the overall significance of the model. (3marks)

QUESTION FOUR

a) Define heteroscedasticity (1mark)

b) State two sources of heteroscedasticity (2marks)

c) What are the consequences of heteroscedasticity (2marks)

d) State three tests for heteroscedasticity (3marks)

e) Consider a simple classical linear regression model given as:

$y = \alpha + \beta X + \mu$

Required:

i) Derive the ordinary least square estimators for the above specified model (4marks)

ii) Show that $\hat{\beta}$ is an unbiased estimator of β (4marks)

iii) Prove that:

E = ($\hat{a}$) =a (4marks)