SOUTH EASTERN KENYA UNIVERSITY

UNIVERSITY EXAMINATIONS 2015/2016

FIRST SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE IN ECONOMICS AND BACHELOR OF SCIENCE IN ECONOMICS AND STATISTICS

STA: 432: APPLIED ECONOMETRICS

Date: 15TH DECEMBER, 2016 **TIME: 4.00-6.00PM**

INSTRUCTIONS TO CANDIDATES

Answer Question **One** and any other **TWO** Questions

QUESTION ONE (30 MARKS)

a) Briefly describe three most common types of data structures used by applied economists (6 marks)

b) State the assumptions of the classical linear regression model (6 marks)

c) Briefly explain how qualitative and ordinal information is incorporated in regression analysis (6 marks)

d) How would you interpret coefficient estimate on a dummy variable (4 marks)

e) State the consequences of heteroskedasticity (4 marks)

f) Briefly explain the tests for heteroskedasticity (4 marks)

QUESTION TWO (20 MARKS)

Consider the earnings model: $Wage_i = \beta_1 + \beta_2 Experi + \beta_3 Educi + u_i$, where $Wage$ is measured in shillings per hour, $Exper$ is work experience in years, and $Educ$ is the number of years of schooling. The table below shows the OLS regression results for 100 males in a given year. Use information given in the tables below and the model above to answer the following questions:

STATA results from OLS estimation of the earnings model

Source of variation	Sum of squares	Degrees of freedom	MS
ESS	2057.5037	2	1028.75185
RSS	6059.71269	97	62.4712648
TSS	8117.21639	99	81.9920847

Variable	Coefficient	Std. Error	t	P>|t|	[95% Conf. Interval]
Intercept	-11.91922	4.750254	-2.51	0.014	-21.34716 to -2.491275
Experience	0.328525	0.0658247	4.99	0.000	0.1978813 to 0.459168
Education	1.435782	0.321546	4.47	0.000	0.7976026 to 2.073962

a) Provide an economic interpretation for the three estimated coefficients. (9 marks)
b) Provide a statistical test that experience doesn't impact wages and that each year of schooling adds one shilling to wage. (6 marks)
c) Calculate the R^2 value and interpret the results. (5 marks)

QUESTION THREE (20 MARKS)

We are interested in estimating the hedonic pricing model of house as follows:

$$\log(Price) = \alpha + \beta * Sqrft + \gamma * Bdrms + u,$$

where Price is the house price, Sqrft is square footage, and Bdrms is the number of bedrooms.

The table below gives regression results.

Variable	Coefficient	Std. Error	t	P>|t|
Intercept	4.766027	0.097044	49.11178	0.0000
Sqrft	0.000379	0.0000043	8.781028	0.0000
Bdrms	0.028884	0.029643	0.974403	0.3326

(a) Predict the percentage change in price when a 150-square-foot bedroom is added to a house. (10 marks)

(b) Let θ= 150β+γ denote the percentage change in price when a 150-square-foot bedroom is added to a house. Show that our model can be written as follows:

$$\log(Price) = \alpha + \beta * (Sqrft - 150 * Bdrms) + \theta * Bdrms + u$$

(10 marks)

QUESTION FOUR (20 MARKS)

Consider the following Cobb-Douglas production function:

$$Q_i = AL_i^{\beta_1} K_i^{\beta_2} \exp(u_i)$$

where Q is quantity of output, L is labor, and K is capital. The table below shows the OLS regression results for $N = 30$. Use the table below and the model above to answer the following questions:

Source of variation	Sum of squares	Degrees of freedom	MS
ESS	56.2849454	2	28.1424727
RSS	5.00527476	27	0.185380547
TSS	8117.21639	99	81.9920847

Variable	Coefficient	Std. Error	t	P>|t|	[95% Conf. Interval]
Intercept	0.4247983	0.1378111	3.08	0.005	0.1420333 to 0.7075633
lnL	0.7358085	0.0657967	11.18	0.000	0.6008048 to 0.8708122
lnK	0.9489907	0.0629072	15.09	0.000	0.8199159 to 1.078066
R-squared	0.9183				
Adj R-squared	0.9123				

a) Provide an economic interpretation for A, β_1, and β_2. (10 marks)
b) Provide a statistical test that the elasticity of output with respect to labor is 0.75. (10 marks)

QUESTION FIVE (20 MARKS)

Suppose you obtain the following fitted model using OLS:

$$sleep = 3840.83(235.11) - 0.163(0.018)totwrk - 11.71(5.86)educ - 8.70(11.21)age + 0.128(0.134)age^2 + 87.75(34.33)male$$

Where $n = 706, R^2 = 0.123$. Standard errors are in parentheses next to each coefficient.
$sleep$: total minutes per week spent sleeping at night.
$totwrk$: total weekly minutes spent working
$Educ$: years of education
Age: age in years
$Male$: = 1 if male, =0 if female

a) Holding other things constant, what is the difference in sleep between men and women, according to these estimates? (5 marks)
b) Is the difference in sleep between men and women statistically significant at the 1% level? (10 marks)
c) What is the effect of being an extra year older on weekly minutes of sleep for someone who is 40 years old? (5 marks)