CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF DOCTOR OF PHILOSOPHY IN BUSINESS MANAGEMENT AND DOCTOR OF PHILOSOPHY IN AGRIBUSINESS MANAGEMENT

DBAM 904/AGEC 912: ECONOMETRICS

STREAMS: **TIME: 3 HOURS**

DAY/DATE: FRIDAY 07/10/2021 **8.30 A.M. – 11.30 A.M.**

INSTRUCTIONS

- **Answer question one and any other three questions**

QUESTION ONE (25 MARKS)

a. Briefly with examples where possible, explain the following terms as used in econometrics.

(i) Type 1 error (2 marks)

(ii) Regression analysis (3 marks)

(iii) Multivariate regression coefficient (2 marks)

(iv) Stochastic error term (2 marks)

b. With relevant examples in each case, state and explain three assumptions of the classical model in econometrics. (6 marks)

c. According to the Gauss–Markov Theorem, given all seven classical assumptions, the OLS coefficient estimators have four major properties. State and explain the four properties. (8 marks)

d. Given the following multivariate linear regression equation (2 marks)

$$\gamma_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \epsilon_i$$

Explain the meaning of the following regression coefficients.

i. β_1

ii. β_3

QUESTION TWO (25 MARKS)

a) Suppose that you estimate the following equation for weight as function of height:

$\widehat{WEIGHT}$ = 103.40 + 6.38HEIGHT

However, when you add a nonsensical variable that measured the student's campus post office box number (MAIL) to the equation. The estimated equation changed to:

$\widehat{WEIGHT}$ = 102.35 + 6.36HEIGHT + 0.02MAIL

i. The estimated coefficient of HEIGHT changed when you added MAIL to the equation. Does that make sense? Why? (5 marks)

ii. In theory, someone's weight has nothing to do with their campus mail box number, yet R^2 went up from 0.74 to 0.75 when MAIL was added to the equation! How is it possible that adding a nonsensical variable to an equation can increase R^2? (3 marks)

iii. Adding the nonsensical variable to the equation decreased $\bar{R}^2$ (Adjusted R squared) from 0.73 to 0.72. Explain how it's possible that $\bar{R}^2$ can go down at the same time that R^2 goes up. (4 marks)

iv. If a person's campus mail box number truly is unrelated to their weight, shouldn't the estimated coefficient of that variable equal exactly 0.00? How is it possible for a nonsensical variable to get a nonzero estimated coefficient? (3 marks)

b) Briefly differentiate between the following;

i. Estimate and Estimator. (4 marks)

ii. Dependent variable and independent variable. (2 marks)

iii. Time series data and Panel data. (4 marks)

QUESTION THREE (25 MARKS)

a. State and explain the five properties of OLS ESTIMATORS given that all the seven classical assumptions are met. (15 Marks)

b. Suppose you are given the following equation of house price as a function of house size:

$\widehat{PRICE}_I = 40.0 + 0.138SIZE_I$

Interpret the following coefficients;

i. $\widehat{\beta_0} = 40.0$ (2 marks)

ii. $\widehat{\beta_1} = 0.138$ (2 marks)

c. Explain three uses of econometrics. (6 marks)

QUESTION FOUR (25 MARKS)

a. Given the following estimated regression equation (standard errors in parentheses):

$\widehat{Y_t} = -120 + 0.10F_t + 5.33R_t \qquad \bar{R}^2 = 0.50$

$(0.05) \quad (1.00)$

Where; Y_t = the corn yield (bushels/acre) in year t

F_t= fertilizer intensity (pounds/acre) in year t

R_t = rainfall (inches) in year t

i. Carefully state the meaning of the coefficients 0.10 and 5.33 in this equation in terms of the impact of F and R on Y. (4 marks)

ii. Does the constant term of -120 really mean that *negative* amounts of corn are possible? If not, what is the meaning of that estimate? (6 marks)

iii. Suppose you were told that the true value of β_F is *known* to be 0.20. Does this show that the estimate is biased? Why or why not? (6 marks)

iv. Suppose you were told that the equation does not meet all the classical assumptions and therefore is not BLUE. Does this mean that the true β_R is definitely not equal to 5.33? Why or why not? (4 marks)

b). The existence of serial correlation in the error term of an equation violates Classical Assumption IV, and the estimation of the equation with OLS some consequences. State and explain two consequences of serial correlation. (5 marks)

QUESTION FIVE (25 MARKS)

a. If the error term of an equation is heteroskedastic, there are three major consequences. Briefly, state and explain the consequences: (10 marks)
b. The existence of serial correlation in the error term of an equation violates Classical Assumption IV, and the estimation of the equation with OLS has at least three consequences. Briefly, state and explain two of these consequences. (6 marks)
c. With notations differentiate between null hypothesis and alternative hypothesis. (4 marks)
d. Explain two justifications of using Cobb-Douglass production function in time series econometrics. (5 Marks)

……