TECHNICAL UNIVERSITY OF MOMBASA

UNIVERSITY EXAMINATIONS 2016/2017

DEGREE OF DOCTOR OF PHOLOSOPHY IN BUSINESS ADMINISTRATION
DSM XXXX: ECONOMETRICS
SET B

DATE: DECMBER 2016 **DURATION:** 2 HOURS

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER THREE

QUESTION ONE (b)

a) The disturbance term u_i { $y_i = \beta_0 + \beta_1 x_i + u_i$ } is a surrogate for all those variables that are omitted from the model but that collectively affect Y. Why not introduce these variables into the model explicitly?

(**5 marks**)

b) Discuss the assumptions underlying the method of least square method

(**20 marks**)

QUESTION TWO

You are given the following model $Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i \quad i = 1,...,15.$

i. Derive the Ordinary Least Squares estimate of the model
ii. Determine the mean of Y

(25 marks)

QUESTION THREE

i) Consider the following non-stochastic models (i.e., models without the stochastic error term). Are they linear regression models? If not, is it possible, by suitable algebraic manipulations, to convert them into linear models?

a. $Yi = 1/(\beta_1 + \beta_2 X_i)$
b. $Yi = Xi/(\beta_1 + \beta_2 X_i)$
c. $Yi = 1/ (1 + \exp(-\beta_1 - \beta_2 X_i)$

(9 marks)

ii) Consider the following model

$$\frac{1}{Y_i} = \beta_1 + \beta_2 \left(\frac{1}{X_i}\right) + u_i$$

Note: Neither Y nor X assumes zero value.
a. Is this a linear regression model?
b. How would you estimate this model?

c. What is the behavior of Y as X tends to infinity?
d. Can you give an example where such a model may be appropriate?

(16 marks)

QUESTION FOUR

Write short notes on the following OLS problems: heteroscedasticity and multicollinearity.
(Hint: Definition, their consequences, how can they be detected and remedies)

(25 marks)

QUESTION FIVE

State with reason whether the following statements are true, false, or uncertain.
Be precise.

a. The t test of significance discussed in this chapter requires that the sampling distributions of estimators $\hat{\beta}_1$ and $\hat{\beta}_2$ follow the normal distribution.

b. Even though the disturbance term in the CLRM is not normally distributed, the OLS estimators are still unbiased.

c. If there is no intercept in the regression model, the estimated u_i ($= \hat{u}_i$) will not sum to zero.

d. The p value and the size of a test statistic mean the same thing.

e. In a regression model that contains the intercept, the sum of the residuals is always zero.

f. If a null hypothesis is not rejected, it is true.

g. The higher the value of σ^2, the larger is the variance of $\hat{\beta}_2$

h. The conditional and unconditional means of a random variable are the same things.

i. In the two-variable PRF, if the slope coefficient β_2 is zero, the intercept β_1 is estimated by the sample mean $\bar{Y}$.

j. The conditional variance, var (Yi | Xi) = σ^2, and the unconditional variance of Y, var (Y) = σ^2_Y , will be the same if X had no influence on Y.

(25 marks)

QUESTION SIX

The following regression results were based on monthly data over the period January 2001 to December 2010:

$\hat{Y}_t$ = 0.00681 + 0.75815X_t	$\hat{Y}_t$ = 0.76214Xt
se = (0.02596) (0.27009)	se = (0.265799)
t = (0.26229) (2.80700)	t = (2.95408)
p value = (0.7984) (0.0186) r^2 = 0.4406	p value = (0.0131) r^2 = 0.43684

where Y = monthly rate of return on Texaco common stock, %, and X = monthly market rate of return,%.

a. What is the difference between the two regression models?

b. Given the preceding results, would you retain the intercept term in the first model? Why or why not?

c. How would you interpret the slope coefficients in the two models?

d. What is the theory underlying the two models?

e. Can you compare the r^2 terms of the two models? Why or why not?

f. The Jarque–Bera normality statistic for the first model in this problem is 1.1167 and for the second model it is 1.1170. What conclusions can you draw from these statistics?

g. The t value of the slope coefficient in the zero intercept model is about 2.95, whereas that with the intercept present is about 2.81. Can you rationalize this result?

(25 marks)