ΠAMIBIA UΠIVERSITY
OF SCIEΠCE AΠD TECHΠOLOGY

FACULTY OF HEALTH AND APPLIED SCIENCES
DEPARTMENT OF ACCOUNTING, ECONOMICS AND FINANCE

QUALIFICATION: BACHELOR OF ECONOMICS	
QUALIFICATION CODE: 07BECO	LEVEL: 7
COURSE CODE: ECM712S	COURSE NAME: ECONOMETRICS
SESSION: June 2019	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
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INSTRUCTIONS
1. Answer ALL the questions in section A and B.
2. Write clearly and neatly.
3. Number the answers clearly.

PERMISSIBLE MATERIALS

1. Scientific calculator
2. Pen and Pencil
3. Ruler

THIS QUESTION PAPER CONSISTS OF _6_ PAGES (Including this front page)

MULTIPLE CHOICE QUESTIONS

1. The statistical significance of a parameter in a regression model refers to:
   a) The conclusion of testing the null hypothesis that the parameter is equal to zero, against the alternative that it is non-zero.
   b) The probability that the OLS estimate of this parameter is equal to zero.
   c) The interpretation of the sign (positive or negative) of this parameter.
   d) All of the above

2. All of the following are possible effects of multicollinearity EXCEPT:
   a) the variances of regression coefficients estimators may be larger than expected
   b) the signs of the regression coefficients may be opposite of what is expected
   c) a significant F ratio may result even though the t ratios are not significant
   d) removal of one data point may cause large changes in the coefficient estimates
   e) the VIF is zero

3. Suppose that you estimate the model $Y = \beta_0 + \beta_1 X + u$. You calculate residuals and find that the explained sum of squares is 400 and the total sum of squares is 1200.
   The R-squared is
   a) 0.25
   b) 0.33
   c) 0.5
   d) 0.67

4. In linear regression, the assumption of homoscedasticity is needed for
   I. unbiasedness
   II. simple calculation of variance and standard errors of coefficient estimates.
   III. the claim that the OLS estimator is BLUE.
   a) I only.
   b) B) II only.
   c) C) III only.
   d) D) II and III only.

e) E) I, II, and III.

5. Which of the following is/are consequences of over specifying a model (including irrelevant variables on the right-hand-side)?

   I.   The variance of the estimators may increase.

   II.   The variance of the estimators may stay the same.

   III. Bias of the estimators may increase.

   a) I only.

   b) II only.

   c) III only.

   d) I and II only.

   e) I, II, and III.

6. Heteroscedasticity means that

   a) Homogeneity cannot be assumed automatically for the model.

   b) the observed units have different preferences.

   c) the variance of the error term is not constant.

   d) agents are not all rational.

7. In a two regressor regression model, if you exclude one of the relevant variables then

   a) OLS is no longer unbiased, but still consistent.

   b) the OLS estimator no longer exists.

   c) you are no longer controlling for the influence of the other variable.

   d) it is no longer reasonable to assume that the errors are homoscedastic.

8. By including another variable in the regression, you will

   a) look at the t-statistic of the coefficient of that variable and include the variable only if the coefficient is statistically significant at the 1% level.

   b) eliminate the possibility of omitted variable bias from excluding that variable.

   c) decrease the regression R^2 if that variable is important.

   d) decrease the variance of the estimator of the coefficients of interest.

9. Which of the following statements is TRUE concerning OLS estimation?
   a) OLS minimises the sum of the vertical distances from the points to the line
   b) OLS minimises the sum of the squares of the vertical distances from the points to the line
   c) OLS minimises the sum of the horizontal distances from the points to the line
   d) OLS minimises the sum of the squares of the horizontal distances from the points to the line.

10. The residual from a standard regression model is defined as
   a) The difference between the actual value, y, and the mean, y-bar
   b) The difference between the fitted value, y-hat, and the mean, y-bar
   c) The difference between the actual value, y, and the fitted value, y-hat
   d) The square of the difference between the fitted value, y-hat, and the mean, y-bar

SECTION B   [80 MARKS]

QUESTION ONE   2018 first   [30 MARKS]

A researcher is using data for a sample of 13 consumers to investigate the relationship between the annual consumption Y_i (measured in thousands of dollars per year) and annual income X_i (measured in thousands of dollars per year).

Year	Y(Consumption)	X(Income)
2003	3081.5	4620.3
2004	3240.6	4803.7
2005	3407.6	5140.1
2006	3566.5	5323.5
2007	3708.7	5487.7
2008	3822.3	5649.5
2009	3972.7	5865.2
2010	4064.6	6062
2011	4132.2	6136.3
2012	4105.8	6079.4
2013	4219.8	6244.4
2014	4343.6	6389.6

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a) $\sum_{i=1}^{N} Y_i =?$; $\sum_{i=1}^{N} X_i =?$; $\sum_{i=1}^{N} Y_i^2 = ?$; $\sum_{i=1}^{N} X^2_i = ?$; $\sum_{i=1}^{N} X_i Y_i =?$;

   $\sum_{i=1}^{N} x^2_i = ?$; $\sum_{i=1}^{N} y_i^2 = ?$; $\sum_{i=1}^{N} x_i y_i = ?$ and $\sum_{i=1}^{N} \hat{y}_i^2 = ?$ [18 marks]

b) Use the information in part a) to compute OLS estimates of the intercept
    coefficient of β_1 and the slope of coefficient β_2.   [4 marks]

c) Interpret the slope coefficient estimate you calculated in part (b) -- i.e., explain
    in words what the numeric value you calculated for β_2 means   [4 marks]

d) Compute the value of R^2, the coefficient of determination for the estimated OLS
    sample regression equation. Briefly explain what the calculated value of R^2
    means.   [4 marks]

QUESTION TWO   second 2017   [30 MARKS]

a) Between sample one and sample two below, which one do you think estimate population
   parameters better i.e. which sample has a small residual sum of square?   [20 marks]

Sample One		Sample Two	
Consumption	Income	Consumption	Income
70	80	55	80
65	100	80	100
90	120	90	120
95	140	80	140
110	160	118	160
115	180	120	180

b) The data in the table below refer to a total population of 16 families in a hypothetical
   community and their weekly income (I) and weekly consumption expenditure (C), both in
   dollars. The 16 families are divided into 4 income groups (from N$80 to N$140) and the
   weekly expenditures of each family in the various groups are as shown in the table below.
                                                                   [10 marks]

	Weekly Family Income			
	80	**100**	**120**	**140**
Weekly Family	75	90	110	135
Expenditure	79	89	80	137
	75	99	98	120
	65		100	129
			115	

Use information in the table above to draw population regression line.

QUESTION THREE   [20 MARKS]

a) Discuss five practical consequences of multicollinearity   [10 marks]

b) Given the following sample regression function, $\hat{Y}_i = \hat{\beta}_1 + \hat{\beta}_2 X_i$, what properties should $\hat{\beta}_2$ fulfill for it to be a best linear unbiased estimator of β_2.   [6 marks]

c) What do we mean by a linear regression model?   [4 marks]

All the best