UNIVERSITY OF ESWATINI

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF ECONOMICS

RESIT EXAMINATION 2018/2019

TITLE OF PAPER   :   **INTRODUCTION TO ECONOMETRICS II**

COURSE CODE   :   **ECO 308**

TIME ALLOWED   :   **TWO (2) HOURS**

INSTRUCTIONS   :

1. ANSWER QUESTION ONE (1) AND ANY OTHER TWO (2) IN THIS PAPER.
2. ONLY SCIENTIFIC NON-PROGRAMMABLE CALCULATORS ARE ALLOWED.
3. ROUND UP YOUR FINAL ANSWERS TO THREE (3) DECIMAL PLACES.
4. IF IT IS NOT SPECIFIED, USE $\alpha = 0.05$ FOR STATISTICAL TESTS.
5. THE REQUIRED PROBABILITY TABLES ARE ATTACHED AT THE BACK OF QUESTION PAPER.

THIS PAPER IS NOT TO BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR

QUESTION 1 (Compulsory   [40 MARKS]

a) Outline the Variance Inflating Factor (VIF), and explain how it may be used to detect the presence of multicollinearity.   [6 Marks]

b) Outline some of the challenges that researchers may encounter when using the Goldfeld – Quandt test procedure to test for the presence of heteroscedasticity in the error variance.   [6 Marks]

c) In some instances, a researcher would want to standardise the variables in a regression model. Illustrate how you can standardise and interpret the variables in the following regression equation : $y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + u_i$ [8 Marks]

d) With the aid of an example, briefly explain the "dummy variable trap"   [6 Marks]

e) In most cases, some variables that we want to include in our regression models are unobservable, hence the use of proxy variables. State the assumptions that should hold for one to use a proxy variable.   [6 Marks]

f) Outline and discuss the weaknesses of the Linear Probability Model (LPM).   [8 Marks]

ANSWER ANY TWO QUESTIONS FROM THE FOLLOWING QUESTIONS

QUESTION 2   [30 MARKS]

a) Differentiate between the Logit and Probit Models.   [10 Marks]

b) A logit model to explain high murder rates versus low murder rates was estimated as follows:

$$\widehat{\ln O_i} = 1.1387 + 0.0014\, Pop_i + 0.0561 Growth_i - 0.4050\, Read_i$$
$$(0.0009) \qquad (0.0227) \qquad (0.1568)$$
$$n = 54, \qquad R^2 = 0.234$$

Where O are the odds of a high murder rate, Pop is the population size in thousands, $Growth$ is the population growth rate, $Read$ is the reading quotient. The values in brackets are standard errors.

i) Interpret the various slope coefficients of the model, stating whether they are statistically significant at the 5% level of significance.   [15 Marks]

ii) Obtain the expression to find the **probability** of murder rates. [5 Marks]

QUESTION 3 [30 MARKS]

a) The Linear Probability model is known to suffer from the problem of heteroscedasticity. For the following model : $Y_i = \beta_1 X_1 + u_i$, provide a proof that shows that the error variances are heteroscedastic. [15 Marks]

b) The following model to explain labour force participation for married women was estimated as follows:

$$\widehat{inlf} = 0.586 - 0.0034\,nwifeinc + 0.038\,educ + 0.039\,exper - 0.0006exper^2$$
$$(0.154)\quad(0.0014)\qquad\quad(0.007)\qquad(0.006)\qquad(0.00018)$$
$$-0.016\,age - 0.262\,kidslt6 + 0.013\,kidsge6$$
$$(0.002)\qquad(0.034)\qquad(0.0132)$$
$$n = 753\quad R^2 = 0.264$$

Where $infl$ is a binary variable that is $= 1$ if the woman reports working for a wage in that year, $nwifeinc$ is the husband's earnings, $educ$ is the years of education, $exper$ is past years of labour experience, $kidslt6$ is the number of children less than 6 years old, and $kidsge6$ is the number of children between the ages of 6 and 18 years.

i) Interpret the coefficients $nwifeinc$, $educ$, and $kidslt6$. [9 Marks]

ii) What is the probability that a married woman with 4 children that are under the age of 6 years participates in the labour force? What can you say about this value? [6 Marks]

QUESTION 4 [30 MARKS]

The following model based on SAT scores was estimated:

$$\widehat{SAT} = 1{,}028.10 + 19.30\,hsize - 45.09\,female - 169.81\,Black + 62.31\,female * Black$$
$$(6.29)\qquad(3.83)\qquad(4.29)\qquad(12.71)\qquad(18.15)$$
$$n = 4{,}137\quad R^2 = 0.0858$$

Where SAT is the SAT score of a student, $hsize$ is the high school class size of student, $female$ is a gender variable (=1 is student is female), $Black$ is a race variable (=1 for Black and 0 otherwise)

a) Holding $hsize$ fixed, what is the estimated difference in SAT score between nonblack females and nonblack males? [7 Marks]

b) Is the estimated difference in (a) above statistically significant? [5 Marks]

c) What is the estimated difference in SAT score between Black females and nonblack females? [9 Marks]

d) How would you test for the statistical significance of the difference in (c) above? [9 Marks]