NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OFCOMMERCE, HUMAN SCIENCE AND EDUCATION

DEPARTMENT OF ECONOMICS, ACCOUNTING AND FINANCE

QUALIFICATION: BACHELOR OF ECONOMICS	
QUALIFICATION CODE: 07BECO	**LEVEL:** 7
COURSE CODE: ECM712S	**COURSE NAME:** ECONOMETRICS
SESSION: JUNE 2024	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	MR. PINEHAS NANGULA
MODERATOR:	Dr R. KAMATI

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 _8_ pages (including this front page)

SECTION A **[20 MARKS]**

MULTIPLE CHOICE QUESTIONS

1. After estimating by OLS a two regression model, the resulting residuals:
   a) Add up to zero if a constant term was included in the model.
   b) Are orthogonal to the model regressors only if a constant term was included in the model.
   c) Have constant variances and null covariances whenever the model errors have these properties.
   d) None of the above

2. What is the difference between R^2 and the adjusted R^2?
   a) the adjusted R^2 always increases as more independent variables are added to the model
   b) the adjusted R^2 is smaller in this case because the constant term is negative
   c) the adjusted R^2 adjusts explanatory power by the degrees of freedom
   d) None of the above

Use the following to answer questions 3-5:

Eight students are selected randomly and their present graduate GPA is compared to their undergraduate GPA and scores on standardized tests.

The data are shown below:

Present GPA	Undergraduate GPA	Standard Scores
3.89	3.77	700
3.03	2.75	460
3.34	3.11	550
3.85	3.75	690
3.93	4	720
3.06	2.92	420
3.69	3.7	670
3.91	3.88	670

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.992759
R Square	
Adjusted R Square	0.9798
Standard Error	0.05485
Observations	8

ANOVA

	df	*SS*	*MS*	*F*
Regression	2	1.027507	0.513754	170.7665
Residual	5	0.015043	0.003009	
Total	7			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	1.106574	0.205921	5.373784	0.003005
Undergr GPA	0.477483	0.162989	2.929546	0.03265
Std Scores	0.001339	0.000669	2.000745	0.101843

3. Write the regression equation, letting undergraduate GPA be variable 1 and standard scores be variable 2.
   a) $Y = 0.4775\ X_1 + 0.0013392X_2$
   b) $Y = 0.2059 + 0.1630X_1 + 0.0006693X_2$
   c) $Y = 1.1066 + 0.4775X_1 + 0.0013392X_2$
   d) none of the above is correct

4. At the 5% level of significance, are undergraduate scores and standard scores significant?
   a) both are significant
   b) neither are significant
   c) only undergraduate GPA is significant
   d) only standard scores are significant

5. Compute R^2.

a) 99.4%
b) 98.6%
c) 20.8%
d) very close to 100%

6. Dummy variables are used when:
   a) qualitative variables are involved in the model
   b) quantitative variables are involved in the model
   c) doing residual analysis
   d) making transformations of quantitative variables

7. Suppose you obtain the following fitted model: $\widehat{bwght} = \hat{\beta}_0 + \hat{\beta}_1 cigs + \hat{\beta}_2 faminc$, where *bwght* is child birth weight in ounces, *cigs* is the average daily number of cigarettes smoked per day by the mother during pregnancy, and *faminc* is family income measured in dollars.

   $\hat{\beta}_0$ is an estimate of
   a) how many cigarettes a day it takes to lower birth weight by 1 ounce, on average
   b) how many ounces an extra cigarette a day lowers birth weight, on average.
   c) how many ounces the average baby weighs, when cigs=0 and faminc=0.
   d) the standard error of cigs.

8. The interpretation of the slope coefficient in the model $lnY_i = \beta_0 + \beta_1 \ln X_i + u_i$ is as follows: a
   a) change in X by one unit is associated with a 100 % change in Y.
   b) 1% change in X is associated with a % change in Y.
   c) 1% change in X is associated with a change in Y of 0.01
   d) change in X by one unit is associated with a change in Y.

9. What will be the properties of the OLS estimator in the presence of multicollinearity?
   a) It will be consistent, unbiased and efficient
   b) It will be consistent and unbiased but not efficient
   c) It will be consistent but not unbiased

d) It will not be consistent

10. Which one of the following statements best describes a Type II error?
    a) It is the probability of incorrectly rejecting the null hypothesis
    b) It is equivalent to the power of the test
    c) It is equivalent to the size of the test
    d) It is the probability of failing to reject a null hypothesis that was wrong

SECTION B **[80 MARKS]**

QUESTION ONE **[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.

	Weekly Family Income			
	80	**100**	**120**	**140**
Weekly Family Expenditure	75	90	110	135
	79	89	80	137

	75	99	98	120
	65		100	129
			115	

Use information in the table above to draw population regression line. [10 marks]

QUESTION TWO **[30 MARKS]**

a) Summary output table of $\hat{Y}_i = \hat{\beta}_1 + \hat{\beta}_2 X_i$ where y-hat is the estimated consumption and x is consumer level of income

Multiple R	0.998906
R Square	**i)**
Adjusted R Square	0.997614
Standard Error	21.14699
Observations	13

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2244134	2244134	5018.24	5.51E-16
Residual	11	**iv)**	447.1954		
Total	12	2249053			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	-158.409	56.99757	**ii)**	0.017929	-283.86
X(Income)	**iii)**	0.009905	70.83953	5.51E-16	0.679847

Use the information above to answer the following questions:

i) Calculate R^2 of this model [3 marks]

ii) Calculate the t statistics of the intercept [3 marks]

iii) Calculate slope coefficient or income parameter [3 marks]

iv) Calculate residual sum of square (RSS) [3 marks]

v) Is this model supposed to be an intercept present model or intercept absent model if adjusted R^2=0.916624 of the absent intercept model? [6 marks]

b) Given the following two summary output tables

Summary output table 1

$[\hat{Y}_i = \hat{\beta}_1 + \hat{\beta}_2 X_i + \hat{\beta}_3 GD_i]$

Regression Statistics	
Multiple R	0.999074
R Square	0.998149
Adjusted R Square	0.987779
Standard Error	20.40407
Observations	13

	df	*SS*	*MS*	*Significance F*
Regression	2	2244890	1122445	2.17E-14
Residual	10	4163.263	416.3263	
Total	12	2249053		

	Coefficients	*Standard Error*	*t Stat*	*Lower 95%*	*Upper 95%*
Intercept	-155.853	55.02788	-2.83226	-278.463	-33.2437
Xi	0.700197	0.009617	72.80746	0.678769	0.721626
GDi	0.000272	0.000202	1.347446	-0.00018	0.000723

Summary output table 2

$[\hat{Y}_i = \hat{\beta}_1 + \hat{\beta}_2 X_i]$

Multiple R	0.998906
R Square	0.997813
Adjusted R Square	0.999914
Standard Error	21.14699
Observations	13

	df	*SS*	*MS*	*Significance F*
Regression	1	2244134	2244134	5.5104E-16
Residual	11	4919.149	447.1954	
Total	12	2249053		

	Coefficients	*Standard Error*	*t Stat*	*Lower 95%*	*Upper 95%*
Intercept	-158.409	56.99757	-2.77923	-283.86022	-32.9586
Xi	0.701647	0.009905	70.83953	0.67984663	0.723447

Did we make a mistake by including government debt (GD) in the model? Use evidence from the two summaries out table to justify your answer. [12 marks]

QUESTION THREE **[20 MARKS]**

a) Use relevant economics examples to discuss two types of error that arise in hypothetical conclusions [8 marks]

b) Discuss three approaches to hypothesis testing. In your discussion, make sure to highlight the decisions rule associated with each approach. [12 marks]

All the best