Tutorial Letter 101/3/2018

Econometrics

ECS3706

Semesters 1 and 2

Department of Economics

This tutorial letter contains important information
about your module.

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CONTENTS

1   INTRODUCTION

Dear Student

We are pleased to welcome you to this Econometrics module and hope that you will find it both interesting and rewarding. We shall do our best to make your study of this module successful. You will be well on your way to success if you start studying early in the semester and resolve to do the assignments properly.

You will receive a number of tutorial letters during the semester. A tutorial letter is our way of communicating with you about teaching, learning and assessment. Some of this study material may not have been available when you registered. Study material that was not available when you registered will be posted to you as soon as possible, but is also available on myUnisa.

Because this is a fully online module, you need to use myUnisa to study and complete the learning activities for this course. Please visit the website for ECS3706 on myUnisa frequently. The website for your module Econometrics is ECS3706-18-S1 or ECS3706-18-S2 for semesters 1 and 2 respectively.

2   PURPOSE OF AND OUTCOMES FOR THE MODULE

2.1   Purpose

This course deals with the problem of specifying and estimating the coefficients of a regression equation (of which the simplest form is: $Y=a+bX$). Everything in this course is aimed at doing this in the most efficient way. Our goal is to find the most accurate estimates of the coefficients of the regression equation, whatever the difficulties which arise.

Three inputs are required to estimate the coefficients of a regression equation.

- The first is economic theory. Economic theory is used to specify the nature of the regression equation. Must we use, for example, the form $Y=a+bX_1+cX_2$ or should we use $\log(Y) =a+bX_1+cX_2+dX_3$? To specify the regression equation correctly requires common sense and a good grasp of economic theory.

- The second input is economic data. In the case of the regression equation $Y = a+bX_1+cX_2$ we need data for variables Y, X_1 and X_2. Some familiarity of working with economic data and some data analysis skills are important. Econometrics also requires extensive calculations.

- The third input is statistics. Statistics not only provides us with formulas to estimate the coefficients of the regression equation, but more than this. The sample estimates of a regression equation are not fully accurate, but are subject to random variation. Statistics is used to evaluate the statistical significance of coefficient estimates, that is, to determine whether the coefficient estimates are sufficiently different from zero in the presence of random variation.

Based on these inputs, this module requires a diverse number of skills.
- Econometrics uses mathematic notation. A mathematical formula is simply the most direct and unambiguous way to describe mathematical processes. You must know mathematical notation.
- You must also have a good grasp of statistics. Econometric techniques are based on statistical concepts.
- Thirdly, because econometrics requires extensive computations, you must also know how to use a personal computer (a PC spreadsheet – MS Excel). The use of a PC is compulsory to perform the assignments. Doing calculations manually is not an option. If you have not used MS Excel before, then you must invest time and effort to learn the basics of MS Excel. You will never regret learning to use MS Excel.

Although this is an introductory module which only deals with a single equation model, it can nevertheless be quite demanding depending on your background. Although the module makes generous use of mathematics and statistics, it still has a practical orientation. Its focus is not, for example, on the theoretical (statistical) derivation of the properties of estimators but rather on their practical meaning, relevance and use.

Econometrics is very useful in economic research. In general, employers highly value the quantitative skills learned in econometrics. We trust that you will find the module both interesting and beneficial to your studies, even beyond your direct academic pursuits.

2.2 Outcomes

Once you have completed this module you should have a thorough understanding of
- how to specify a regression equation
- how to apply regression analysis to estimate an equation
- how to perform hypotheses testing
- how to identify and remedy some of the problems which occur in econometrics.

3   LECTURERS AND CONTACT DETAILS

3.1   Lecturers

We, the lecturers who are responsible for this module, are available to assist you with any enquiries concerning the prescribed content. You may contact us as follows:

LECTURER'S NAME	BUILDING & OFFICE NUMBER	TELEPHONE NUMBER	Email ADDRESS
Khumalo, J. Mr (Module Leader)	Club 1 Room 2-29	+27(0)12 433-4605	khumamj@unisa.ac.za
Lelaka, K. Mr	Club 1 Room 2-38	+27(0)12 433-4677	lelakk@unisa.ac.za

You will find more contact detail such as telephone numbers, building and office numbers of the lecturers in Tutorial Letter 302. You can also contact us by e-mail via *my*Unisa.

All queries that are not of a purely administrative nature but **are about the content of this module** should be directed to us. Please have your study material with you when you contact us.

3.2   Lecturer availability

The lecturers for this module will be available to take phone calls on academic matters and/or to attend to students who may prefer to visit personally for academic engagement. However, the days and times of lecturers' availability will be communicated in the module page on myUnisa. These days and times are subject to change from time to time in order to accommodate the lecturer's work schedule and other commitments. The changes on the days and times will be communicated by the lecturer in advance through the announcement option on myUnisa as and when this happen. Students are advised to check the module page on myUnisa before making phone calls or visiting the lecturer's office for academic enquiries/engagements.

3.3   Department

The Department of Economics is located in Hazelwood. The physical address is **Club 1 Building, Corner of Dely Road and Pinaster Avenue, Hazelwood, Pretoria**.

3.4   University

To contact the university about matters not related to the content of this module, please consult the publication: *my Studies @ Unisa* which you received with your study material or visit Unisa website at http://www.unisa.ac.za. This brochure and the website contain information on how to contact the university (e.g. to whom you can write for different queries, important telephone and fax numbers, addresses and details of the times certain facilities are open).

Always have your student number at hand when you contact the university.

4   MODULE-RELATED RESOURCES

4.1   Prescribed books

The only compulsory prescribed textbook for this course is compiled and customized specifically for ECS3706 Module for Unisa students. It is compiled from the 2010 and 2014 issues of "*Studenmund, AH. 2010 & 2014. Using econometrics: A practical guide. 6th edition, International edition (2010) as well as Pearson New International edition (2014)*

> **Using econometrics: A practical guide. UNISA custom edition. Harlow Pearson Education. ISBN: *9781784476908***

Note that the cover page of this textbook has, on the left upper corner the name "UNISA" and the module code "ECS3706" just above the title. **Please make sure you buy the correct textbook**.

Please consult the list of official booksellers and their addresses in *my Studies @ Unisa* brochure. Prescribed books can be obtained from the University's official booksellers. If you have any difficulty obtaining books from these booksellers, please contact the Prescribed Book Section at 012 429 4152 or email address vospresc@unisa.ac.za .

4.2   Recommended books

For the benefit of students who wish to consult other sources:
- You may use formally recommended books (which are not prescribed). The recommended books can be obtained from the library. A list of recommended titles appears below.
- Each title has been allocated a book number which you should supply on the request card when requesting books from the Library.

- Gujarati, DN and Porter,DC. 2009. Basic Econometrics. 5th Edition. New York. McGraw-Hill.
- Stock, J.H. and Watson, M.W. 2015. Introduction to Econometrics. 3rd Edition. Pearson Education.

4.3 Electronic Reserves (e-Reserves)

There are no electronic reserves for this module, however the files containing the data needed to answer assignment 01 in both semester 1 and semester 2 are available on *myUnisa* under additional resources. The files are given as follows:

- Excel file ECS3706_18_S1_A1 Needed to answer Assignment 1 in first semester and

- Excel file ECS3706_18_S2_A1 Needed to answer Assignment 1 in second semester.

5 STUDENT SUPPORT SERVICES FOR THE MODULE

For information on the various student support systems and services available at Unisa (e.g. student counselling, tutorial support programme and classes, language support), please consult the publication *my Studies @ Unisa* that you received with your study material.

5.1 Contact with fellow students – study groups

It is advisable to have contact with fellow students. One way to do this is to form study groups. You can get the names of other students in your area for the same modules by contacting the Department of Student Admission and Registration. For further information, please consult the *Studies @ Unisa* brochure.

5.2 myUnisa

If you have access to a computer that is linked to the internet, you can quickly access resources and information at the university. The *my*Unisa learning management system is Unisa's online campus that will help you to communicate with your lecturers, with other students and with the administrative departments of Unisa – all through the computer and the internet.

To go to the *my*Unisa website, start at the main Unisa website, http://www.unisa.ac.za, and then click on the "Login to *my*Unisa" link on the right-hand side of the screen. This should take you to the *my*Unisa website. You can also go there directly by typing in http://my.unisa.ac.za.
Please consult my *Studies @ Unisa* brochure.

5.3 Tutorial Support Programme

Unisa offers tutor services for students as additional academic support at the various Unisa regional learning centres throughout the country. A tutorial is an organised session where students and tutor(s) meet regularly at a common venue and at scheduled times to discuss course material. The main purpose of the tutorial services is to facilitate student learning by developing the student's independent learning skills and assisting students to become motivated and independent learners. Tutorials help the students to develop and enhance their learning experience and academic performance through interaction with the tutor and fellow students. Tutorials are not compulsory and willing students receive tutorial support at a nominal fee. **Interested students are advised to consult a learning centre closest to them to enrol for tutorials**. For further information on learning centres and tutorials consult the brochure *my Studies @ Unisa*.

Note that tutors are not necessarily available for all modules and/or at all learning centres. The Department of Economics has no means of providing you with any tutorial support if you did not follow the abovementioned steps.

6   MODULE-SPECIFIC STUDY PLAN

Some guidance regarding the studying of this module and preparation for the examination is provided below:

- You cannot pass this module by memorising and merely reproducing this module's content, you must understand the underlying principles. The examinations test your ability to apply principles. In the examination you will have to interpret results and to solve problem situations which you may have never seen before.
- If you have not previously completed statistics courses/modules, you must face the additional workload of understanding the basic statistical concepts. This matter is dealt with in chapters 12, 4 and 5 of the textbook.
- This module makes use of mathematical notation which offers a shorthand way of referring to complex concepts. You must understand the different functional forms (the nature of an equation, logarithms, power functions etc). The module also requires you to understand a number of simple proofs which require basic algebra.

- Although the examination does not require a PC, we at least expect you to be familiar with a spreadsheet (MS Excel) when completing the assignments. Basic spreadsheet skills, for example, entering formulas and using copy & paste, are not dealt with in the study guide. If you have never used a spreadsheet before, then this is the time to familiarise yourself with one of the most powerful calculation tools ever devised. It will change your life. Your lecturer can provide help if all else fails.

Experience has shown repeatedly that working diligently and continuously throughout the semester markedly improves students' chance of success in this module. You cannot cram for this module — you simply have to allow sufficient time to develop your understanding of the issues. There are no shortcuts to success!

To help you to work on this module regularly and systematically, we provide a proposed study programme below and three assignments (see section 9). The due dates for the assignments to be submitted to Unisa are indicated in the proposed study programme. The assignments are provided in section 8.

PROPOSED STUDY PROGRAMME: FIRST SEMESTER

STUDY WEEK	WEEK STARTING	LEARNING UNIT or study instruction
1	5 February	1 and 2
2	12 February	3
3	19 February	4 and 12
4	26 February	Complete compulsory Assignment 01
5	5 March	5
6	5 March	**Remember to submit compulsory Assignment 01:** **Closing date: 9 March 2018**
7	19 March	6
8	26 March	7
9	2 April	**Complete and submit Assignment 02:** **Closing date: 5 April 2018**
10	9 April	8
11	16 April	9 and 10
12	23 April	11 **Complete self assessment Assignment 03**
13+	30 April	Prepare for examination

PROPOSED STUDY PROGRAMME: SECOND SEMESTER

STUDY WEEK	WEEK STARTING	LEARNING UNIT or study instruction
1	9 July	1 and 2
2	23 July	3
3	30 July	4 and 12
4	6 August	**Complete and submit compulsory Assignment 01:** **Closing date: 13 August 2018.**
5	13 August	5
6	20 August	5
7	27 August	6
8	4 September	7 **Complete and submit Assignment 02:** **Closing date: 5 September 2018.**
9	10 September	8 and 9
10	17 September	
11	24 September	10 and 11 **Complete self assessment Assignment 03**
12+	1 October	Prepare for examination

7   MODULE PRACTICAL WORK AND WORK-INTEGRATED LEARNING

There are no practicals for this module.

8   ASSESSMENT

8.1   Assessment plan

Assessment will be done by the module leader and, where applicable, the module team and/or the examiner(s). The name(s) of examiner(s) will also be indicated on examination question papers.

Assessment criteria used for the assignments will done as follows: the multiple-choice questions in Assignment 01 will be marked electronically in accordance with mark-reading 'masters' provided to the Assignment section by the module leader. One mark will be awarded for each correct answer. No marks will be deducted for incorrect answers. Assignment 02 is a written assignment.

Assessment of assignments

As part of the ongoing quality assurance process in the Department of Economics, a year mark is awarded for all assignments completed throughout the year. The year mark counts 20% and the examination mark counts 80% of the final mark awarded for a paper.

In this regard, the following rules and procedures set out the way in which assignments are administered and marked:

- There are two assignments during the year.
- Assignment 01 is compulsory for all students who intend to write the final exam in May/June or Oct/Nov 2018.
- There are no repeats of any assignment.
- There are no extensions to the due dates for any assignment.
- The date on which an assignment is deemed to be received is the date at which it is recorded and logged on by Student Administration.
- Assignments received after the due date will be dealt with as follows:

    i)   **Grace period**: up to a week past the due date (7 days including weekends and public holidays) is allowed for *postal* and other delays without any penalty.
    ii)   P**enalty**: assignments received more than 7 days after the closing date will be marked but no marks will be awarded.

- Anyone who fails and re-registers for a module the following semester must submit all assignments again as set out above.

Here are two examples to help you understand how the system works:

Example A

Assignment	Due date	Date received	Marks Achieved (%)	% of Mark
1	**9 March or 13 August**	**17 March or 21 August**	88	88
		After 17 March or 21 August 2018	88	0
2	**5 April or 5 September**	**13 April or 13 September**	38	38
		After 20 April or 20 September	38	0

Calculation of year mark: (0.40 x 88% + 0.60 x 38%) = 35.2 + 22.8 = 58, if both assignments 1 and 2 were submitted. Note that assignment 1 contributes 40% while assignment 2 contributes 60% towards your year mark. Divide 47.4% above by 5 to get the mark out of 20 or multiply by 0.20.

Year mark 58/5 = 11.6 or 58 x 0.2 = 11.6

In example A, the marks were calculated as follows:
Assignment 1 was received late, but within the one-week grace period. The mark included in the year is thus in proportion to the mark achieved for the assignment and there is no penalty;
Assignment 2 was received late, after the 7 days of the due date, the assignment will be marked but a zero (0) mark will be awarded.

Importance of the year mark!

Note that even if you perform relatively poorly in the examination, a good year mark could help you to get a final pass mark. For example, assume that you only got 53% in the examination. If you had a year mark of 58%, you would nevertheless get a final mark of 56.4% calculated as follows:

Examination mark + year mark

= (53 x 0.80) + (58 x 0.20)

= 42.4 + 11.6

= 54 percent final mark

NB: Please note that a sub-minimum mark of 40% in the examination is required, below which the year mark will not count even if your year mark is 90%. Your final mark will then be the mark you obtained in the examination.

Importance of submitting assignments by the due date

In example A above you can see that late submission of assignments can result in exclusion from the examination. The following are ways in which you can ensure that your assignments are received by the due date:

- Register as early as possible at the beginning of the year. Do not wait until the final deadline for registration.
- Once you have registered and received your TL101, buy the textbook and order all the prescribed work as soon as possible.

Note that assignment 01 is compulsory. The first assignment will contribute 40% to the semester mark and the second assignment 60%. The second assignment is not compulsory, but will still contribute 60% towards your semester mark.

Please note: Although students may work together when preparing assignments, each student must write and submit his or her own individual assignment. In other words, you must submit your own ideas in your own words, sometimes interspersing relevant short quotations that are properly referenced. It is unacceptable for students to submit identical assignments on the basis that they worked together. That is copying (a form of plagiarism) and none of these assignments will be marked. Furthermore, you may be penalised or subjected to disciplinary proceedings by the university.

For general information and requirements as far as examinations are concerned, see the brochure *my Studies @ Unisa* which you received with your study material.

Please note that the applications for, and the administration of re-marks of examination scripts are handled solely by the Examinations department and not academic departments.

8.2   General assignment numbers

Assignments are numbered consecutively per module, starting from 01. In this module there are three assignments per semester, namely 01, 02 and 03.

8.2.1   Unique assignment numbers

In addition to the general assignment number (eg 01 or 02), each assignment (multiple-choice questions and written assignments) has its own unique assignment number (eg 102717). In this module assignment 01 consists of only multiple-choice questions and therefore must be completed on a marking-reading sheet with an own unique assignment number. Assignment 02 is a written assignment and has its own unique assignment number as well. Please fill in this unique assignment number on the cover page of the assignment in the space provided for it.

8.2.2   Due dates for assignments

Please note that the due dates for the submission of assignments to Unisa are indicated in the proposed study programme as well.

The first ten questions of Assignment 01 are designed to obtain information required for the compilation of a student profile for this module. Your kind cooperation in this regard is requested, as this information assists the department in its on-going efforts to ensure quality tuition. Your marks for this assignment will be based on your answers to questions 11 to 25. Make sure that when capturing your correct options online, you start with the student profile questions followed by the assignment questions (questions 1.11 to 1.25)

SEMESTER 1:   ASSIGNMENTS SUBMISSION DATES

Assignment number	Unique number	Closing date	Contents of assignments	Type of assignment
01	667137	9 March	Learning Units 1 to 3 and 12	Multiple-choice
02	690564	5 April	Learning Units 4 to 7	Written
03	-	-	Learning Units 8 to 10	Self-assessment

SEMESTER 2: ASSIGNMENTS SUBMISSION DATES

Assignment number	Unique number	Closing date	Contents of assignments	Type of assignment
01	750028	13 August	Learning Units 1 to 3 and 12	Multiple-choice
02	859821	5 September	Learning Units 4 to 7	Written
03	-	-	Learning Units 8 to 10	Self-assessment

8.3 Submission of assignments

You may submit written assignments and assignments completed on mark-reading sheets either by post or electronically via *my*Unisa. **Assignments may not be submitted by fax or e-mail**.

For detailed information on assignments, please refer to *my Studies @ Unisa* brochure which you received with your study package.

To submit an assignment via *my*Unisa:

- Go to *my*Unisa.
- Log in with your student number and password.
- Select the module.
- Click on "Assignments" in the menu on the left-hand side of the screen.
- Click on the assignment number you wish to submit.
- Follow the instructions.

8.4 Assignments

FIRST SEMESTER ASSIGNMENTS

SEMESTER 1

COMPULSORY ASSIGNMENT 01

DUE DATE: 9 March 2018

UNIQUE NUMBER: 667137

You must fill in your answers on an assignment mark reading sheet if you submit your assignment by post. If you submit online via myUnisa, make sure you select a total of 25 questions 10 for student profile + 15 content questions). If you choose 15 questions on the system, then your first 10 questions will get you zero since these questions are not awarded marks. Please make sure that you also complete the following sections on the assignment mark reading sheet

- your name and address and **student number**
- the code of the Learning Unit (module code)
- the **unique assignment** number as indicated in the table above. Note that there are different unique numbers for the first and second semesters.

Questions on student profile

1.1 Which ONE of the following is most true regarding your current registration.

   [1] This is my first registration.
   [2] I have been registered for this module before but have never written the examination.
   [3] I have written the examination for this module once before.
   [4] I have written the examination for this module twice before.
   [5] I have written the examination for this module three or more times before.

1.2 In my matric results (students who do not have a South African matric please select the option you think is the most relevant.)

[1] I passed Mathematics (higher grade) or equivalent with a C-symbol or higher.
[2] I passed Mathematics (higher grade) or equivalent with a D-symbol or lower.
[3] I passed Mathematics (standard grade) or equivalent with a C-symbol or higher.
[4] I passed Mathematics (standard grade) or equivalent with a D-symbol or lower.
[5] I did not do take Mathematics for matric or I failed it.

1.3 In my matric results (students who do not have a South African matric please choose the option you think is the most relevant.)

[1] I passed English (higher grade) or equivalent with a C-symbol or higher.
[2] I passed English (higher grade) or equivalent with a D-symbol or lower.
[3] I passed English (standard grade) or equivalent with a C-symbol or higher.
[4] I passed English (standard grade) or equivalent with a D-symbol or lower.
[5] I did not do take English for matric or I failed it.

1.4 Which ONE of the following describes your situation best?

[1] I am a full-time student who does not work at all.
[2] I am a full-time student who works part-time for extra pocket money (not to pay for my studies).
[3] I am a full-time student who works part-time to pay for my studies.
[4] I work full-time and study only after hours, and the work that I do is not related to my degree at all.
[5] I work full-time and study only after hours, and the work that I do is related to my degree.

Questions on administrative matters

1.5 Regarding service delivery by the Economics Department:

[1] I have never tried to contact the Economics department.
[2] I have contacted the department but they were not helpful.
[3] I have tried to contact the department telephonically but was not successful.
[4] I have tried to contact the department by e-mail but never received a reply.
[5] I have contacted the department and was satisfied with the service.

Questions on study material and study programme

1.6   The section(s) of the study guide that I had to study to complete this assignment

[1]   helped me to work through the textbook systematically.
[2]   did not help me to understand the study material in the textbook better.
[3]   was totally irrelevant to the assignment questions.
[4]   I did not use the study guide at all although I have one.
[5]   I have not received a study guide.

1.7   Do you plan to attend tutorial classes for this module?

[1]   Yes.
[2]   No, I can cope on my own.
[3]   No, I have to work.
[4]   No, it is too far from where I live.
[5]   No, for any other reason.

Questions on technology access

1.8   Which ONE of the following best describes your access to SMS–messages?

[1]   I can receive SMS-messages on my own cell phone.
[2]   I can receive SMS-messages on the cell phone of someone who lives with me.
[3]   I can receive SMS-messages on the cell phone of someone I know but who does not live with me.
[4]   I cannot receive SMS-messages at all.
[5]   I do not know what a SMS-message is.

1.9   Which ONE of the following best describes your access to a computer?

[1]   I have unlimited access to a computer.
[2]   I have access to a computer but do not know how to use it for study purposes.
[3]   I have to pay to use a computer (e.g. internet café).
[4]   I can only use a computer as a favour.
[5]   I do not have any access to a computer.

1.10 Which ONE of the following applies to you ?

[1] I do not have access to either internet or e-mail.
[2] I have access to e-mail.
[3] I have access to internet.
[4] I have access to both internet and e-mail.

Questions 1.11 to 1.19 require you to estimate a linear regression function $Y_t = \beta_0 + \beta_1 X_{1t} + \varepsilon$ (equation 1) by OLS method. The data is provided in Table A1 below. The same data is available on myUnisa module site, ECS3706-18-S1 under additional resources.

Derive your answers from basic principles, that is, use MS Excel to compile a table similar to Table 1 of the prescribed book (See p41): The calculation of estimated regression coefficients for the Weight/Height example).
Please use a spreadsheet to perform the calculations. Please use full accuracy (no rounding) in all calculations since rounding may significantly affect your results.

Table A1

Quarter	Y = GDP	X₁ = Exports	X₂ = Imports	Description
1960Q1	140.0	49.9	27.2	Y = GDP measured in
1960Q2	143.1	51.1	30.5	billions of Rands
1960Q3	146.9	53.2	28.7	X = Exports measured in
1960Q4	148.7	48.3	26.9	billions of Rands
1961Q1	146.7	52.9	27.8	X_2 = Imports (billions)
1961Q2	147.2	54.1	27.6	
1961Q3	154.4	53.1	23.4	$\overline{Y}$ = Sample average of
1961Q4	152.6	56.8	24.0	series Y
1962Q1	154.9	57.7	24.6	$\overline{X}_1$ = Sample average of
1962Q2	156.5	61.1	24.4	series X_1
1962Q3	163.5	57.4	26.0	$y_i = Y_i - \overline{Y}$
1962Q4	163.1	59.1	29.1	
1963Q1	162.7	61.5	29.9	$x_{1i} = X_{1i} - \overline{X}_1$
1963Q2	166.8	64.5	31.6	
1963Q3	176.1	62.9	30.9	$\hat{\beta}_0$ = OLS estimate of β_0
1963Q4	179.6	64.3	31.9	
1964Q1	176.5	63.1	35.9	$\hat{\beta}_1$ = OLS estimate of β_1
1964Q2	182.5	67.4	38.1	
1964Q3	187.7	67.4	38.9	$\hat{\beta}_2$ = OLS estimate of β_2
1964Q4	192.9	67.8	41.0	
1965Q1	191.7	66.8	41.3	
1965Q2	195.8	67.7	47.3	
1965Q3	195.8	67.2	43.3	
1965Q4	201.5	72.2	37.0	
1966Q1	195.6	68.7	35.4	
1966Q2	201.5	68.1	34.6	
1966Q3	209.0	71.8	39.5	
1966Q4	213.5	69.0	41.1	
1967Q1	208.6	70.0	44.8	
1967Q2	214.1	72.5	47.3	
1967Q3	227.5	74.9	44.1	

1.11 Which of the following statements is/are **correct** according to the OLS method in the case of $Y_t = \beta_0 + \beta_1 X_{1t} + \varepsilon$?

a $\quad \hat{\beta}_1 = \dfrac{\sum x_{1i} y_i}{\sum x_{1i}^2}$

b $\quad \hat{\beta}_0 = \bar{Y} - \hat{\beta}_1 \bar{X}$

c $\quad \hat{\beta}_0 = \dfrac{\Delta X}{\Delta Y} * Y + \mu$

[1]   a and b
[2]   a and c
[3]   b and c
[4]   a only
[5]   Not [1], [2], [3], or [4]

1.12 Which of the following statements is/are **correct**?

a   The degrees of freedom from residual is 30
b   The degrees of freedom from regression 15
c   mean of Y = 177 (rounded to whole number, 176 or 178 also acceptable)

[1]   a and b
[2]   b and c
[3]   a and c
[4]   b
[5]   Not [1], [2], [3], or [4]

1.13 Which of the following statements is/are **correct**?

a $\quad \sum Y_i = 5497$

b $\quad \sum xy = 4597$ (rounded to nearest whole number)

c $\quad \sum x^2 = 18883$

[1]   a only
[2]   b only
[3]   c only
[4]   a and c
[5]   All statements are correct

1.14 Which of the following statements is/are **correct**?

    a $\hat{\beta}_1 = 12.415$ (rounded to 3 decimals)

    b   RSS = 1840 (rounded to nearest whole number)

    c $\hat{\beta}_0 = 3.1876$ (rounded to 4 decimals)

    [1]   a

    [2]   b

    [3]   c

    [4]   a and b

    [5]   b and c

1.15 Which of the following statements is/are correct?

    a $e_{1960Q3} = -0.3$ (rounded to 1 decimals)

    b   ESS = 199656 (rounded to nearest whole number)

    c $\hat{Y}_{1967Q1} = 1000$ (rounded to 4 decimals)

    [1]   a only

    [2]   a and b only

    [3]   a and c only

    [4]   b and c only

    [5]   All statements are correct

1.16 Which of the following statements is/are correct?

    a   ESS = TSS – RSS = 17 (rounded to nearest whole number)

    b   The standard error of $\hat{\beta}_0$ = 12.27 (rounded to 2 decimals)

    c   The standard error of $\hat{\beta}_1$ is 0.19 (rounded to 2 decimals)

    [1]   a only

    [2]   b only

    [3]   c only

    [4]   a and b

    [5]   b and c

1.17 Which of the following statements is/are correct?

    a   t Statistic for the intercept is 106.685 (rounded to 3 decimals)

    b   the probability (P-value) associated with $t_{\hat{\beta}_0}$ is 0.078 (rounded to 3 decimals)

    c   The sum of Y = 1054

    [1]   a only
    [2]   a and b only
    [3]   c only
    [4]   b only
    [5]   All statements are incorrect

1.18 Which of the statements is/are correct?

    a   the coefficient $\hat{\beta}_1$ = 3.1876 indicates that when exports increase by one billion, GDP will increase by 3 billion.

    b   xy for the year 1979 is 10.872.

    c   The number of observation (N) = 41 and k (number of coefficients, excluding the constant) = 2 in a univariate regression equation.

    [1]   a and b
    [2]   a and c
    [3]   b and c
    [4]   a, b and c
    [5]   Not [1], [2], [3], or [4]

1.19 Which of the following statements is/are correct?

    a   The estimated regression equation $Y_t = \beta_0 + \beta_1 X_{1t} + \varepsilon$ based on data provided in table A1 shows that there is a negative relationship between GDP and exports.

    b   RSS = TSS + ESS.

    c   given data on table A1, yx = xy

    [1]   a and b only
    [2]   a and c only
    [3]   b and c only
    [4]   a, b and c
    [5]   Not [1], [2], [3] or [4]

Questions 1.20 to 1.23 require you to estimate the regression equation:

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \varepsilon \quad \text{(Equation 2)}$$

Where Y and X_1 are the same as in Table A1 and X_2 is the Imports.

1.20 Which of the following statements is/are **correct**?

a   The R^2 increased when GDP was regressed against exports and imports, compared to when only exports variable was used as an explanatory variable.

b   Inclusion of X_2 as an additional determinant of GDP leads to an improved overall fit of the estimated model.

c   The degrees of freedom from residual and the adjusted R^2 are given as N − k − 1 = 31 − 2 − 1 = 28 and 0.9257 respectively.

[1]   a
[2]   b
[3]   c
[4]   a, b and c
[5]   None of the statements are correct

1.21 Which of the following statements is/are **correct** regarding the estimated coefficients of equation 2?

a $\hat{\beta}_0 = -5.559$ (rounded to 3 decimals)

b $\hat{\beta}_1 = 2.374$ (rounded to 3 decimal)

c $\hat{\beta}_2 = 1.003$ (rounded to 3 decimals)

[1]   a
[2]   a and b
[3]   b
[4]   All statements are correct
[5]   Not [1], [2], [3] or [4]

1.22 Which of the following statements is/are **correct**?

    a   The average GDP is 177 billion.

    b $\sum X_{2i} = 105$.

    c   Equation 2 is an example of a univariate regression

    [1]   a and b only.
    [2]   b and c only.
    [3]   a and c only.
    [4]   a, b and c.
    [5]   Not [1], [2], [3] or [4].

1.23 Which of the following statements is/are **correct**?

    a   Exports have a negative effect on GDP.
    b   Variable X_1 in both equations is the dependent.
    c   The residual sum of squares (equation 2) = 1309 (rounded to nearest whole number)

    [1]   a only
    [2]   b only
    [3]   c only
    [4]   a, b and c
    [5]   Not [1], [2], [3] or [4]

Questions 1.24 and 1.25 are based on the information below.
A survey about the number of beds per household in one small rural village reveals the following (assuming X refers to the number of beds)

X	P(X)
0	0.30
1	0.15
2	0.17
3	0.19
4	0.13
5	0.06

1.24 Which of the following statements is/are correct?

    a   The expected value of X = 1.88

    b   It must be true that $\sum\limits_{\text{all } X_i} P(x_i)=1$ if X is a discrete random variable

    c $0 \leq P(x_i) \leq 1$ for all x

    [1]   a, b and c
    [2]   b and c only
    [3]   a and c only
    [4]   a and b only
    [5]   Not [1], [2], [3] or [4]

1.25 Which of the following statements is/are correct?

    a   The variance of X = 19.856 (rounded to 3 decimals)
    b   The probability that a household has at least 3 beds = 0.38
    c   If X is a discrete random variable, it implies that X assumes countable values

    [1]   a
    [2]   a and b
    [3]   a, b and c
    [4]   b and c
    [5]   b only

Assignment 02
- is optional, but contributes significantly towards your semester mark hence your final mark.
- consists of typical examination type questions.

Question A1 (15 marks)

(a) Suppose you are given a regression euation as $Y = \beta_0 + \beta_1 X_i + \varepsilon_i$, where ε_i is the stochastic error term. After estimation, the estimated equation is $\hat{Y} = \hat{\beta}_1 + \hat{\beta}_2 X_t$ and e_i is the residual error term. Briefly explain what is meant by the stochastic error term (ε_i) and why it is important to include it in a regression equation. How is this term related to the residual error term? (7)

(b) Briefly define econometrics. List the three major uses of econometrics and any two inputs that are needed in order to achieve the goal of econometrics. (8)

[15]

Question A2 (15 marks)

(a) List four sources of variation which contribute to the stochastic error term; explain why the stochastic error term is likely to be normally distributed and why a normally distributed stochastic error tem is desirable. (6)

(b) Explain the meaning of the following concepts by referring to the sampling distribution of $\hat{\beta}$ (9)
   a. An unbiased estimator of $\hat{\beta}$.
   b. A minimum variance estimator of $\hat{\beta}$.
   c. A consistent estimator of $\hat{\beta}$.

[15]

Question B1 (20 marks)

A model below represents annual military spending in a country A. The estimated regression equation and other results are given as follows;

$$P_i = 2.0 + \underset{(0.10)}{0.50}M_i + \underset{(20.0)}{25.0}S_i + \underset{(1.01)}{0.8}A_i + \underset{(4)}{3.05}B_i - \underset{(0.4)}{0.16}C_i$$

$$R^2 = 0.78; DW = 1.32; r_{M,A} = -0.75$$

Where

DW = Durbin-Watson statistic

Pi = the number of monthly child support payment that the ith man missedin the last 3 years

Mi = the number of months the ith man was unemployed in the last 3 years

Si = the percentage of disposable income that goes to shild support payments for the ith man

Ai = the age of ith man (years)

Bi = the religious beliefs of the ith man (a scale of 1 to 4, with 4 being the most religious)

Ci = the number of children the ith man has to support

$r_{M,A}$ = the correlation coefficient between M and A

(a)   Your friend expects that the coefficients of M and S to be positive and that of A to be different from zero.Test these hypotheses if N = 30.   (8)

(b)   Develop and test hypothesis for the coefficients of B and C using the 10 percent level and N = 18

(4)

(c)   Interpret the the overall regresion results (variable coefficients, R^2, DW and $r_{M,A}$) and Do you think you can trust these regression results?

(8)

[20]

Question 1 (20 marks)

A researcher AB found the following results

Dependent variable = GDP

Variable	Coefficient	Standard error
Constant term	-2.210	0.354
EXP	0.8864	0.4186
EXP(-1)	0.4370	0.096
IMP	-0.9642	0.2571
INF	-0.2365	0.0911
INF(-1)	0.3641	0.3187

R-squared = 0.78; Durbin-Watson statistic = 0.864; Sample size = 40
The correlation coefficients : $r_{INF,inf(-1)}$ = 0.85; $r_{EXP, EXP(-1)}$ = -0.76.

The variables are as follows:
GDP = gross domestic product.
EXP = value of exports
EXP(-1) = past value of exports(i.e exports lagged once).
IMP = value of imports
INF = inflation
INF(-1) = inflation lagged once

Perform all statistical tests at the 5% level of significance (unless stated otherwise).

(a) Hypothesise signs and state appropriate null and alternative hypotheses for the coefficients based on theoretical considerations (provide reasons for your choice).Test the coefficients at the 5% level of significance. (13)

(b) Is the lagged inflation a useful predictor of GDP?   Support your answer with calculations   (1)

(c) What econometric problems are present (in any) in this regression? Explain   (3)

(d) Test the overall performance of the model and the presence of serial correlation.   (3)

[20]

Question 2 (20 marks)

The following regression results are obtained from a housing prices equation in Cape Town. The dependent variable is house prices (HP). Use this information to answer the questions below.

Variable	Coefficient	Std. Error	t-Statistic
C	182.3031	33.62101	5.422298
S	0.086373	0.011137	7.755401
A	-1.869710	0.906212	-2.063215
A^2	0.015699	0.009524	1.648268
N	-29.89189	4.928443	-6.065179
Y	0.005334	0.001469	3.630397

R-squared	0.8178
Adjusted R-squared	0.806760
F-statistic	82.6900(0.00)
Durbin-Watson stat	1.759940

Variables:

HP = price (in R millions) of the ith house

S = size (in square meters) of the ith house

A = age of the ith house in years

A^2 = squared age of ith house

N = the quality of the neighbourhood of the ith house (1 = best, 5 = worst).

 Y = income

(a) Interpret fully the regression results and explain the meaning of each of the estimated coefficients. State if the signs of the coefficients bear the correct signs based on economic theory.   (17)

(b) What is the problem (if any) with these results and how would you correct such problem   (3)

[20]

Question 3 (20 marks)

The following regression equation has been estimated for dividends and profits for a company in country A

$$\ln Dividend = B_1 + B_2 \ln CP + B_3 Time + u_t$$

Where

Ln = natural log

CP = company profits

The time or trend variable is included in the model to allow for the upward trend in the two variables.

	Coefficient	std. error	t-Statistic	Prob.
Constant	0.435764	0.192185	2.267414	0.02430
LnCP	0.424535	0.077733	5.461456	0.00000
Time	0.012691	0.001421	8.930795	0.00000
R-squared	0.991424			
Adj. R-squared	0.991353			
F-statistic	13930			
Prob (F-statistic)	0.00000			
Durbin-Watson stat	0.090181			

(a) Interpret fully the regression results and explain the meaning of each of the estimated coefficients. State if the signs of the coefficients bear the correct signs based on economic theory. (15)

(b) What is the problem (if any) with these results and how would you rectify such problem (if any) (5)

[20]

SECOND SEMESTER ASSIGNMENTS

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SEMESTER 2

COMPULSORY ASSIGNMENT 01

DUE DATE: 13 August 2018

UNIQUE NUMBER: 750028

</div>

You must fill in your answers on an assignment mark reading sheet. Please make sure that you also complete the following sections on the assignment mark reading sheet

- your name and address and **student number**
- the code of the Learning Unit
- the **unique assignment** number as indicated in the table above. Note that there are different assignment questions and different unique numbers for the first and second semesters.

Questions on student profile

1.1   Which ONE of the following is most true regarding your current registration.

   [1]   This is my first registration.
   [2]   I have been registered for this module before but have never written the examination.
   [3]   I have written the examination for this module once before.
   [4]   I have written the examination for this module twice before.
   [5]   I have written the examination for this module three or more times before.

1.2   In my matric results (students who do not have a South African matric please select the option you think is the most relevant.)

   [1]   I passed Mathematics (higher grade) or equivalent with a C-symbol or higher.
   [2]   I passed Mathematics (higher grade) or equivalent with a D-symbol or lower.
   [3]   I passed Mathematics (standard grade) or equivalent with a C-symbol or higher.
   [4]   I passed Mathematics (standard grade) or equivalent with a D-symbol or lower.
   [5]   I did not do take Mathematics for matric or I failed it.

1.3 In my matric results (students who do not have a South African matric please choose the option you think is the most relevant.)

[1] I passed English (higher grade) or equivalent with a C-symbol or higher.
[2] I passed English (higher grade) or equivalent with a D-symbol or lower.
[3] I passed English (standard grade) or equivalent with a C-symbol or higher.
[4] I passed English (standard grade) or equivalent with a D-symbol or lower.
[5] I did not do take English for matric or I failed it.

1.4 Which ONE of the following describes your situation best?

[1] I am a full-time student who does not work at all.
[2] I am a full-time student who works part-time for extra pocket money (not to pay for my studies).
[3] I am a full-time student who works part-time to pay for my studies.
[4] I work full-time and study only after hours, and the work that I do is not related to my degree at all.
[5] I work full-time and study only after hours, and the work that I do is related to my degree.

Questions on administrative matters

1.5 Regarding service delivery by the Economics Department:

[1] I have never tried to contact the Economics department.
[2] I have contacted the department but they were not helpful.
[3] I have tried to contact the department telephonically but was not successful.
[4] I have tried to contact the department by e-mail but never received a reply.
[5] I have contacted the department and was satisfied with the service.

Questions on study material and study programme

1.6 The section(s) of the study guide that I had to study to complete this assignment

[1] helped me to work through the textbook systematically.
[2] did not help me to understand the study material in the textbook better.
[3] was totally irrelevant to the assignment questions.
[4] I did not use the study guide at all although I have one.
[5] I have not received a study guide.

1.7   Do you plan to attend tutorial classes for this module?

[1]   Yes.
[2]   No, I can cope on my own.
[3]   No, I have to work.
[4]   No, it is too far from where I live.
[5]   No, for any other reason.

Questions on technology access

1.8   Which ONE of the following best describes your access to SMS–messages?

[1]   I can receive SMS-messages on my own cell phone.
[2]   I can receive SMS-messages on the cell phone of someone who lives with me.
[3]   I can receive SMS-messages on the cell phone of someone I know but who does not live with me.
[4]   I cannot receive SMS-messages at all.
[5]   I do not know what a SMS-message is.

1.9   Which ONE of the following best describes your access to a computer?

[1]   I have unlimited access to a computer.
[2]   I have access to a computer but do not know how to use it for study purposes.
[3]   I have to pay to use a computer (e.g. internet café).
[4]   I can only use a computer as a favour.
[5]   I do not have any access to a computer.

1.10 Which ONE of the following applies to you ?

[1]   I do not have access to either internet or e-mail.
[2]   I have access to e-mail.
[3]   I have access to internet.
[4]   I have access to both internet and e-mail.

Questions 1.11 - 1.20 require you to estimate a regression function $Y = b_0 + b_1 X_1 + \varepsilon$ by the OLS method where

     Y   :   Consumption (Kilograms)

     X_1 :   The price of chicken (per kilogram)

The data is provided in Table 2 below. The same data will be made available on myUnisa module site ECS3706-18-S2 under additional resources.

Derive your answers from basic principles, that is, use MS Excel to compile a table analogous to Table 1 of the prescribed book.

Please use a spreadsheet to perform the calculations. Please use full accuracy (no rounding) in all calculations since rounding may significantly affect your results.

Table 2:   Data to estimate $Y_i = b_0 + b_1 X_{1i} + \varepsilon_i$

Year	Consumption Y	Price of chicken X_1	Price of beef X_2	Description
1989	39.7	42.3	143.8	
1990	38.69	49.4	152.2	Sample: Annual data
1991	42.02	45.5	145.7	Y = Quantity of chicken (kg)
1992	42.71	45.3	145.9	X_1 = Price of chicken (rands per kg)
1993	44.75	49.3	178.8	X_2 = Price of beef (rands per kg)
1994	48.35	50	222.4	
1995	48.47	53.5	233.6	$\overline{Y}$ = Sample average of Y
1996	50.37	53.8	234.7	
1997	51.52	51.5	238.4	$\overline{X}_1$ = Sample average of X_1
1998	52.55	56	234.1	
1999	54.61	61.5	235.5	$y_i = Y_i - \overline{Y}$
2000	56.42	56.2	228.6	$x_{1i} = X_{1i} - \overline{X}_1$
2001	57.7	63.1	226.8	PrC = price of chicken
2002	61.94	53.1	238.4	PrB = price of beef
2003	63.8	62.1	250.3	
2004	66.88	64.2	265.7	
2005	70.34	60.5	281	
2006	73.26	57.7	288.3	
2007	76.39	59	284.6	
2008	78.27	27.1	293.4	
2009	79.65	26.2	282.9	
2010	79.27	26.9	284.3	
2011	80.61	28	280.2	
2012	83.1	33.2	279.5	
2013	83.76	33.4	277.1	
2014	88.98	39.5	287.8	
2015	90.08	43	306.4	
2016	89.71	43.4	337.7	
2017	94.37	43.9	331.5	

1.11 Which of the following statements is/are **correct**? According to the OLS method (in the case of $Y = b_0 + b_1 X_1 + \varepsilon$):

a $\hat{b}_1$ = average of B

b $\hat{b}_1 = \dfrac{\sum x_i y_i}{\sum y_i^2}$ where $x_i = PrB_i - average(PrB)$ and $y_i = Y_i - average(Y)$

c $\hat{b}_1 = \dfrac{\sum x_i y_i}{\sum x_i^2}$ where $x_i = PrB_i - average(PrB)$ and $y_i = Y_i - average(Y)$

[1]   a and b
[2]   a and c
[3]   b only
[4]   all statements are correct
[5]   Not [1], [2], [3] or [4]

1.12 Which of the following statements is/are **correct**?

a   The degrees of freedom 29 – 1 – 1 = 27
b   The sample average of Y = 912
c   The sample average of X_1 is 645

[1]   b
[2]   a and b
[3]   b and c
[4]   c
[5]   Not [1], [2], [3] or [4]

1.13 Which of the following statements is/are **correct**?

a $\sum x_1^2 = 3545$

b $\sum xy = 961$

c $\sum y^2 = 8538.6$

[1]   a only
[2]   c only
[3]   a and b
[4]   a, b and c
[5]   Not [1], [2], [3] or [4]

1.14 Which of the following statements is/are **correct**?

a $\hat{b}_1 = 96.260$ (rounded to 3 decimals)

b $\hat{b}_0 = -0.655$ (rounded to 3 decimals)

c $\hat{b}_1 = -0.655$ (rounded to 4 decimals)

[1]   a
[2]   b
[3]   c
[4]   a, b and b
[5]   Not [1], [2], [3] or [4]

1.15 Which of the following statements is/are **correct** ?

a $\hat{Y}_{2009} = 79$

b $e^2_{2011} = 7.236$

c $\sum e_i = 71.51$ (rounded to 2 decimals)

[1]   a and b
[2]   b and c
[3]   a
[4]   b
[5]   Not [1], [2], [3] or [4]

1.16 Which of the following statements is/are **correct**?

a $TSS = 8538.6$ (rounded to 1 decimal)

b $TSS = \sum e_i^2 = 1888$

c $ESS = TSS - RSS = 1652$ (rounded to nearest whole number)

[1]   a and c
[2]   a only
[3]   b only
[4]   c only
[5]   Not [1], [2], [3] or [4]

1.17 Which of the following statements is/are **correct**?

a $R^2 = 1 - \dfrac{\sum e_i^2}{\sum (Y_i - Average(Y))^2} = 0.193$ (rounded to 3 decimal)

b   sum of xy = 65.11

c   the t statistic associated with $b_0 = 7.6$

[1]   a only

[2]   a and b

[3]   b and c

[4]   a and c

[5]   Not [1], [2], [3] or [4]

1.18 Which of the following statements is/are **correct**?

a   if price of beef increases by 1, consumption of chicken decreases by 1 million units.

b   if income increases by 1 million, then consumption increases by about 88 percent

c   if income increases by 1% then Y would increase by 13 million

[1]   a

[2]   b

[3]   c

[4]   a, b and c

[5]   Not [1], [2], [3] or [4]

1.19 Which of the following statements is/are **correct**?

a   The mean of X_1 is given by $\dfrac{\sum_{i=1}^{n} X_{1i}}{N}$

b   If $R^2 = 1$, it implies that all the points lie exactly on the regression line.

c $R^2 = 0.193$ (rounded to 3 decimals)

[1]   a and b

[2]   a, b and c

[3]   b only

[4]   b and c

[5]   Not [1], [2], [3] or [4]

1.20 Which of the following statements is/are **correct**?

a The variance of Y is the square root of the mean of X, i.e. $\mathrm{var} = \sqrt{X}$

b A discrete random variable takes only countable numbers such as 0,1, 2, 3, ….

c In an equation $Y_i = b_0 + b_1 X_{1i} + \varepsilon_i$, the residual error term ($\hat{\varepsilon}_i$) $= Y_i - \hat{b}_0 - \hat{b}_1 X_{1i}$

[1] a

[2] c

[3] a and c

[4] b and c

[5] Not [1], [2], [3] or [4]

Questions 1.21 to 1.22 require you to estimate the regression equation:

$Y = b_0 + b_1 X_1 + b_2 X_2 + \mu$ (Equation 2)

Where: Y and X_1 are the same as in Table 2 and X_2 is the price of beef.

Use Excel's Add-in or Lines (Y,X) function to estimate equation 2.

1.21 Which of the following statements is/are **correct** regarding the coefficient estimates of equation 2?

a $\hat{b}_0 = 11.87$ (rounded to 3 decimals)

b $\hat{b}_1 = -0.359$ (rounded to 3 decimals)

c $\hat{b}_2 = 0.284$ (rounded to 3 decimals).

[1] a and b

[2] a and c

[3] b and c

[4] a, b and c

[5] Not [1], [2], [3] or [4]

1.22 Which of the following statements is/are **correct** in respect of the estimates of equation 2?

  a   Standard Error of $\hat{b}_2$ = 0.02 (rounded to 2 decimals).

  b   Regressing Y on X_1 and X_2 has led to an improvement in $\overline{R}^2$ to indicate that adding X_2 was necessary (in equation 2).

  c   The t-statistic for X_1 coefficient is 520 (rounded to whole number).

  [1]   a and b
  [2]   b and c
  [3]   a, b and c
  [4]   a only
  [5]   Not [1], [2], [3] or [4]

Questions 1.23 to 1.25 deal with learning unit 12

1.23 Which of the following statements is/are **correct**?

Suppose a cyclist was selected randomly from a group of cyclists and his weight was recorded. The probability that the selected cyclist weighs a particular weight is assumed as in table below. Let X be the weight of a cyclist.

Weight in Kgs (X)	Probability
55	0.17
58	0.05
60	0.16
62	0.03
64	0.01
66	0.10

a $\sum P(X) = 1$ in the case that X is a discrete random variable.

b The expected value of X = 62.5

c The standard deviation of X=200

[1] a

[2] b

[3] a and c

[4] a and b

[5] Not [1], [2], [3] or [4]

1.24 Which of the following statements is/are **correct**?

a The standard deviation is equals to $\sqrt{\text{variance}(Y)}$ x $\sqrt{\text{variance}(X)}$.

b The standardised X at age 34 is 528kg.

c The value of X – mean of X at age 30 = 2.

[1] a and b

[2] a and c

[3] b and c

[4] a, b and c

[5] Not [1], [2], [3] or [4]

1.25 Which of the following statements is/are **correct**?

a   The probability that a cyclist weighs at least 60kg is 0.725
b   The expected value of $\hat{\beta}$ is always equal to the true population parameter regardless of whether such estimate is biased or unbiased.
c   A standardised variable has a mean of zero and a standard deviation of one.

[1]   a, b and c
[2]   a and b
[3]   b and c
[4]   a and c
[5]   Not [1], [2], [3] or [4]

SEMESTER 2

ASSIGNMENT 02

DUE DATE: 5 September 2018

UNIQUE NUMBER: 859821

Assignment 02

- is optional, but contributes significantly towards your semester mark, hence your final mark.
- consists of some typical examination type questions.

Question 1 (15 marks)

A researcher estimated the demand for maize and obtained the following results.

The Dependent variable: Maize.

Variable	Coefficient	t-statistic	Other Statistics
Constant	4.2854	8.104	$R^2 = 0.695$
P_r	-0.0094	1.907	Durbin-Watson = 1.3576
Y	0.03917	0.841	F-statistic = 71.96
P_{PS}	4.5529	10.475	
P_{MM}	-0.2456	1.387	

Where: P_R = price of maize

Y = Income of consumer

P_{SP} = Price of substitute product

P_R = Price of rice

Critical t-statistic at 5% is 2.253.

(a) Evaluate these results with respect to its economic meaning, overall fit, signs and significance of coefficients. What econometric problem(s) (if any) does this regression have? How would you solve the problem(s) associated with this model? **[15]**

Question A2 (15 marks)

The regression results below are based on the aggregate demand function for passenger cars. The dependent variable is represented by Y.

Variable	constant	LogX₁	LogX₂	LogX₃	LogX₄
Coefficient	10.05	0.8504	-2.6792	3.6462	-0.4
t-statistic	(0.652)	(1.408)	(-2.701)	(1.6129)	(-0.1268)

$R^2 = 0.672$

The critical t-statistic at 5% level of significance is 1.67.

Log Y   =   quantity demanded for passenger cars
Log X1   =   price of new car
Log X2   =   inflation
Log X3   =   income
Log X4   =   interest rate

(a) Evaluate and interpret the results. Can these results be trusted and why? (12)

(b) What problem(s) is/are likely to be present in this model and how would you remedy such problem? (3)

[15]

Question B1 (20 marks)

A researcher investigated the relationship between daily wage Y (thousands of Rands per month) and the company's year of operation X using data for a sample of 350 employees. The preliminary analysis of the sample data gives the following information:

$$\sum_i^N X_i = 2885, \quad \sum_i^N Y_i = 3056, \quad \sum_i^N X_i^2 = 31719, \quad \sum_i^N Y_i^2 = 19647, \quad \sum_i^N X_iY_i = 17151, \quad \sum_i^N x_iy_i = 3437,$$

$$\sum_i^N x_i^2 = 20233, \quad \sum_i^N y_i^2 = 8837, \quad \sum_i^N e_i^2 = 3099$$

Where, $x_i = X_i - \bar{X}$ and $y_i = Y_i - \bar{Y}$ for i = 1, 2, ..., n.

(a) Use the above information to compute the OLS estimates of the intercept coefficient β_0 and the slope coefficient β_1 from the equation $Y_i = \beta_0 + \beta_1 X_{1i} + \mu_i$. Show all formulae used and calculations. (8)

(b) What do these estimates (β_0 and β_1) tell you about the Y and X relationship? (5)

(c) Calculate the values of R^2, adjusted-R^2 and the explained sum of squares (ESS) for the estimated OLS sample regression equation. Interpret fully the R^2 and adjusted-R^2. (7)

[20]

Question 1 (20 marks)

A researcher estimated the demand for rice model and found the following results. The Dependent variable: Energy drink (ED).

Variable	Coefficient	t-statistic	Other Statistics
Constant	2.854	4.104	$R^2 = 0.85$
P_r	-0.004	-2.907	Durbin-Watson = 1.76
Y	0.03917	0.841	$r_{ps,cc} = 0.79$
P_{PS}	4.5529	10.475	
P_{CC}	0.2456	1.387	

Where: P_R =   price of energy drink
             Y   =   disposable income
             P_{SP} =   Price of substitute product
             P_{CC} =   Price of coca cola
             $r_{ps,cc}$ =   Correlation coeficient between PS and CC

Critical t-statistic at 5% is 1.553.

(a)   Evaluate this regression results with respect to its economic meaning, overall fit, signs and significance of coefficients.

(16)

(b)   What econometric problem(s) (if any) does this regression have? How would you solve the problem(s)?   (4)

[20]

Question 2 (20 marks)

(a)   Carefully describe and distinguish between perfect and imperfect multicollinearity.   (4)
(b)   What is the nature of the problem of multicollinearity?   (1)
(c)   What are the consequences of serial correlation and how would you detect it?   (5)
(d)   What are the remedies of heteroskedasticity?   (4)

(e) Suppose you are given the correlation coefficients as follow:

$X_{1,2} = 0.995$; $X_{1,3} = 0.961$; $X_{1,4} = 0.567$; $X_{2,3} = 0.859$; $X_{2,4} = 0.631$ and $X_{3,4} = -0.485$.

Can the OLS regression results obtained by regressing the dependent variable Y on Xs, whose correlation coefficients are given above be trusted? Why?   (6)

[20]

Question 3 (20 marks)

(a) Suppose the original regression on demand for transport services (bus transport) is given as follows: The dependent variable is represented by Y.

Variable →	constant	LogX$_1$	LogX$_2$	LogX$_3$
Coefficient	10.05	-0.9504	-2.6792	1.6462
Standard error	(0.652)	(0.408)	(-0.901)	(1.613)

Adjusted $R^2 = 0.76$, correlation coefficient between X_1 and X_2 ($X_{1,2}$) = 0.855.

The critical t-statistic at 5% level of significance is 1.67.

Log Y   =   quantity demanded for transport services (buses)
Log X1   =   price of bus ticket per trip
Log X2   =   inflation
Log X3   =   income

Two other regressions were done, first dropping X$_2$ and secondly, dropping X$_1$ and comparing the two regressions with the original regression. The regressions for the two equations are:

Variable →	constant	LogX$_1$	LogX$_2$	LogX$_3$	Adjusted R^2
Coefficient	-12.05	-2.051		1.672	Adj. R^2 = 0.892
Standard error	(4.652)	(-0.808)		(0.969)	
Coefficient	-22.757		-1.049	1.052	Adj. R^2 = 0.272
Standard error	(-2.678)		(-3.194)	(0.407)	

(a) Which regression between the original, regression 1 and regression 2 would you prefer and why?

(8)

(b) If the same variables are regressed in their original forms without the consideration of logs using linear OLS, how you would interpret the estimation results from the second equation if the coefficients were the same?   (12)

9   OTHER ASSESSMENT METHODS

There are no other assessment methods for this module.

10   EXAMINATION

10.1 Assessment of examination

For general examination guidelines and examination preparation guidelines, please refer to *my Studies @ Unisa* brochure.

Please note that application for, and the administration of remark of examination scripts are dealt with solely by the Examinations Department and not by academic departments

10.2 Examination admission

The management of the University decided to continue with compulsory assignments in all modules to ensure students fully benefit from the formative tuition and assessment. You are, therefore, required to submit a compulsory assignment (Assignment 01) to obtain admission to the examination.

Please ensure that you submit the correct assignments that correspond with your registration. For example, if you have registered for the first-semester course, you should submit Assignments 01 and 02 under Semester 1. Should you fail to submit Assignment 01, you will be denied admission to the examination (even if all your answers are correct). Admission to the examination will be subject to the submission of the compulsory assignment (Assignment 01) and not the marks obtained for it.
Please ensure that this assignment reaches the University on or before the due date! Should the assignment not be submitted in time, you will not qualify for admission to the examination.

Also, please note that a sub-minimum applies to the year mark. You must obtain at least 40% in the final examination to ensure your semester mark is included in the final mark.

For example, if you obtain 99% in the assignments and 35% in the final examination, your final mark will not include the 99% year mark because the mark obtained in the examination is less than the required sub-minimum (threshold). In this case, your final mark will be 35% (which is the examination mark). Please ensure you familiarise yourself with this important academic rule.

The examination mark

The percentage obtained in the examination is used to calculate your final mark.

Final mark

The assignments will constitute 20% of the year mark, while the examination will contribute 80% towards the final year mark.

The final mark, which is based on your semester (year) mark and the examination mark, will be calculated as follows:

Semester mark (20%) + Examination mark (80%)
<center>**OR**</center>
Semester mark (out of 100) x 20% + Examination mark (out of 100) x 80%

For example:
Suppose you obtained a semester mark of 52,5% and an examination mark of 60%. Your final mark will be calculated as follows:

$$(52,5 \times 20\%) + (60 \times 80\%)$$
$$= (52,5 \times 0,2) + (60 \times 0,8)$$
$$= 10,5 + 48$$
$$= 58,5\%$$

- If your final mark (as calculated above) is 50% or more, you pass ECS3706.
- If your final mark (as calculated above) varies between 45% and 49%, you do not pass ECS3706, but qualify for a supplementary examination.
- If your final mark (as calculated above) is 45% or less, you fail ECS3706 and you have to re-register for ECS3706.

Examination period

This module is offered in a semester period of approximately 15 weeks. This means that if you are registered for the first semester, you will write the examination in May/June 2018 and the supplementary examination will be written in October/November 2018. If you are registered for the second semester you will write the examination in October/November 2018 and the supplementary examination will be written in May/June.

During the semester, the Examination Section will provide you with information regarding the examination in general, examination venues, examination dates and examination times.

Examination paper

The structure of the examination paper for 2018 is as follows:
It is a two-hour paper and consists of 2 sections (A and B) making up a total of 100 marks.

In **section A** you must answer all the questions. You will be asked to explain certain concepts and relationships, and short essay type questions which are based on the content of the whole module. The total number of marks for this section is 60 marks.

In **section B** you must answer two out of three questions. Each question will count 20 marks. You will be asked to explain certain concepts and relationships, and short essay type questions which are based on the content of the whole module. In order for you to do well in this section, you should at least know how to interpret the regression results in addition to knowing the econometrics concepts. The total number of marks for this section is 40 marks.

Previous Examination papers

Some previous examination papers are available to students on *my*Unisa under the "official study material" folder. Should you obtain previous examination papers from elsewhere, we advise you not to focus on such old papers only as the content of modules and, therefore, examination papers may change from year to year. To concentrate only on previous examination papers will not guarantee a pass. You must be able to answer questions on all the prescribed work and study outcomes.

Past statistics

There has been varying pass rates in the two semesters each year and the students registered for the first semester were found to be doing better in their final assessment compared to those registered for the second semester. The May/June 2017 examination produced a 72 percent pass rate, while the October/November 2016 examination had a pass rate of 54 percent. We strive to improve on these results every year with the hope that you will also do your part by starting your studies early, participating on discussion forums, submitting your assignments before the due dates as well as interacting with your fellow classmates with regard to the module.

Wishing you the best with your studies.

Your Lecturers

Mr. MJ Khumalo
Mr. K Lelaka