UNIVERSITY OF SWAZILAND

FINAL EXAMINATION PAPER

PROGRAMME: BSc. In Agricultural Economics and Agribusiness Management

COURSE CODE: AEM 302

TITLE OF PAPER: INTRODUCTION TO ECONOMETRICS

TIME ALLOWED: TWO HOURS

INSTRUCTIONS: 1. ANSWER ANY FOUR QUESTIONS.
2. EACH QUESTION CARRIES 25 MARKS

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QUESTION ONE

Consider the following selected information from a computer printout of a regression analysis:

Predictor	coefficient	standard error	t ratio
Constant	2.82033	0.32156	8.7708
X	0.87090	0.12496	6.9694

Df = 18

Index of determination (r^2) = 0.7296

Analysis of Variance

Source	SS	DF	MS
Regression	111.2011	1	111.201
Error	41.206	18	2.289
Total	152.40719		

Answer the following questions:

(a) Write the regression equation (5 marks)
(b) What percentage of variation in Y is explained in the model? (4 marks)
(c) What is the sample size n used for the above regression analysis? (4 marks)
(d) What is the range of values between which regression slope will fall, 95% of the time? (4 marks)
(e) Does the model represent a significant linear relationship between X and Y? (4 marks)
(f) State your conclusion and p value. (4 marks)

QUESTION TWO

Consider the following regression:

$Y = -10.96 + 0.93X_2 - 2.09X_3$
$t = (-3.33) \quad (249.06) \quad (-3.09)$ $R^2 = 0.9996$ $n = 15$
$F = 83,753.7$ $\alpha = 5\%$

Where Y = personal consumption expenditure
X_2 = disposable income
X_3 = prime rate (%) charged by banks

a. What is the marginal propensity to consume (MPC)? (3 marks)
b. Is the MPC statistically different from zero? (4 marks)
c. What is the rationale for the inclusion of the prime rate variable in the model? *A priori*, would you expect a negative sign for this variable? (4 marks)
d. Is b_3 significantly different from zero? (4 marks)
e. Test the hypothesis that $R^2 = 0$. (4 marks)
f. Compute the standard error of each coefficient. (6 marks)

QUESTION THREE

a. Discuss the methodology of econometric research using suitable examples. (10 marks)
b. What do we mean by a **linear** regression model? What are its assumptions? (5marks)
c. What is the role of the stochastic error term μ in the regression analysis? (5 marks)
d. What is the difference between the stochastic error term and the residual, $\hat{\mu}$? (5 marks)

QUESTION FOUR

The following table gives the quantities of commodity z bought in each year from 2001 – 2010 and the corresponding prices.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Quantity	770	785	790	795	800	805	810	820	840	850
Price	18	16	15	15	12	10	10	7	9	6

Assuming all the assumptions of CLRM are fulfilled, obtain

a. b_1 and b_2 (6 marks)
b. Standard errors of these estimators (6 marks)
c. r^2 (4 marks)
d. Establish 95% confidence intervals for B_1 and B_2 (6 marks)
e. On the basis of the confidence intervals established in (d), can you accept the hypothesis that $B_2 = 0$? Why? (3 marks)

QUESTION FIVE

Consider the following demand function for maize meal among UNIWSA students

$$Q = b_0 + b_1 P + \mu$$

a. Write the set of normal equations for the demand function (5 marks)
b. Interpret the coefficients b_0 and b_1, defining their sign. (5 marks)
c. Make a list of some important variables which have been omitted form the above demand function and discuss how you would expect changes in these factors to 'shift' the demand function. (5 marks)
d. Show that the slope (b_1) is a component of the price elasticity of demand. (5 marks)
e. If $b_0 = 200$ and $b_1 = -20$, compute the price elasticity when $p = 5$ (5 marks)

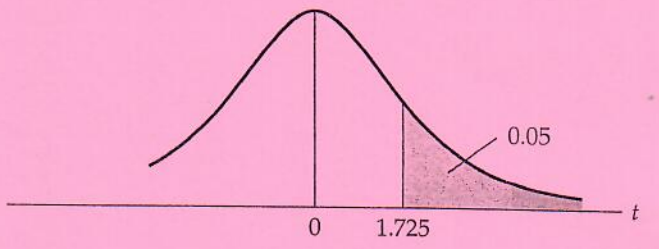
TABLE E-2 PERCENTAGE POINTS OF THE t DISTRIBUTION

Example

$\Pr(t > 2.086) = 0.025$

$\Pr(t > 1.725) = 0.05$ for d.f. = 20

$\Pr(|t| > 1.725) = 0.10$



Pr / d.f.	0.25 0.50	0.10 0.20	0.05 0.10	0.025 0.05	0.01 0.02	0.005 0.010	0.001 0.002
1	1.000	3.078	6.314	12.706	31.821	63.657	318.31
2	0.816	1.886	2.920	4.303	6.965	9.925	22.327
3	0.765	1.638	2.353	3.182	4.541	5.841	10.214
4	0.741	1.533	2.132	2.776	3.747	4.604	7.173
5	0.727	1.476	2.015	2.571	3.365	4.032	5.893
6	0.718	1.440	1.943	2.447	3.143	3.707	5.208
7	0.711	1.415	1.895	2.365	2.998	3.499	4.785
8	0.706	1.397	1.860	2.306	2.896	3.355	4.501
9	0.703	1.383	1.833	2.262	2.821	3.250	4.297
10	0.700	1.372	1.812	2.228	2.764	3.169	4.144
11	0.697	1.363	1.796	2.201	2.718	3.106	4.025
12	0.695	1.356	1.782	2.179	2.681	3.055	3.930
13	0.694	1.350	1.771	2.160	2.650	3.012	3.852
14	0.692	1.345	1.761	2.145	2.624	2.977	3.787
15	0.691	1.341	1.753	2.131	2.602	2.947	3.733
16	0.690	1.337	1.746	2.120	2.583	2.921	3.686
17	0.689	1.333	1.740	2.110	2.567	2.898	3.646
18	0.688	1.330	1.734	2.101	2.552	2.878	3.610
19	0.688	1.328	1.729	2.093	2.539	2.861	3.579
20	0.687	1.325	1.725	2.086	2.528	2.845	3.552
21	0.686	1.323	1.721	2.080	2.518	2.831	3.527
22	0.686	1.321	1.717	2.074	2.508	2.819	3.505
23	0.685	1.319	1.714	2.069	2.500	2.807	3.485
24	0.685	1.318	1.711	2.064	2.492	2.797	3.467
25	0.684	1.316	1.708	2.060	2.485	2.787	3.450
26	0.684	1.315	1.706	2.056	2.479	2.779	3.435
27	0.684	1.314	1.703	2.052	2.473	2.771	3.421
28	0.683	1.313	1.701	2.048	2.467	2.763	3.408
29	0.683	1.311	1.699	2.045	2.462	2.756	3.396
30	0.683	1.310	1.697	2.042	2.457	2.750	3.385
40	0.681	1.303	1.684	2.021	2.423	2.704	3.307
60	0.679	1.296	1.671	2.000	2.390	2.660	3.232
120	0.677	1.289	1.658	1.980	2.358	2.617	3.160
∞	0.674	1.282	1.645	1.960	2.326	2.576	3.090

Note: The smaller probability shown at the head of each column is the area in one tail; the larger probability is the area in both tails.

Source: From E. S. Pearson and H. O. Hartley, eds., *Biometrika Tables for Statisticians,* vol. 1, 3rd ed., Table 12, Cambridge University Press, New York, 1966. Reproduced by permission of the editors and trustees