



**UNIVERSITY OF RUHUNA
FACULTY OF MANAGEMENT AND FINANCE**

Bachelor of Business Administration Degree Programme 2000 Level

Semester 2 End Examination (March 2022)

Academic Year 2020/2021

ACC 22113 - Introductory Econometrics

Duration: Three hours

The question paper contains five (5) questions.

Total Marks: 70

Answer all questions.

Scientific calculators are allowed.

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- (1) (A) Define econometrics. (2 Marks)
(B) List the key steps in econometric methodology. (2 Marks)
(C) Explain what is meant by a variable using an example. (2 Marks)
(D) Briefly discuss what is meant by inference. (4 Marks)
(E) Explain the concept of probability using an example. (4 Marks)
(Total: 14 Marks)
- (2) (A) Explain the difference between a statistic and a parameter. (2 Marks)
(B) Explain two properties of a normal distribution. (2 Marks)
(C) What is meant by standard error of mean? (2 Marks)
(D) Explain a procedure to construct a sampling distribution of mean. (4 Marks)
(E) Briefly discuss the central limit theorem. (4 Marks)
(Total: 14 Marks)
- (3) (A) Explain what is meant by a hypothesis using an example. (2 Marks)
(B) Indicate the significance level and confidence level on a graph. (2 Marks)
(C) A researcher is studying water expenses of families and wants to determine if the monthly water expenses have increased since last year when the average was Rs. 260 per month. He draws a random sample of 20 families and have calculated that the sample mean is Rs. 330.6 and standard error of the mean is 30.8. If you want to see whether the average water expenses of families have been increased recently based on the sample data, state which test statistic would you calculate and then calculate the test statistic. (2 Marks)
(D) You have been supplied with the following information relating to the profitability of a sample of firms from two industries. Assume that you want to investigate whether there is any difference in the performance of firms between these two industries.

Firms in Industry A	ROE	Firms in Industry B	ROE
1	10	1	9
2	7	2	5
3	8	3	4
4	12	4	4
5	12	5	2
6	11	6	9
7	10	7	2
		8	3
		9	5

- (i) Name the statistical technique you are going to use in this situation and state the hypotheses for a two tailed test. (1 Mark)
- (ii) Assuming the variances between the groups are equal, calculate the mean difference and degrees of freedom. (2 Marks)
- (iii) If the standard error of the difference is 1.1861, estimate the 95% confidence interval. (2 Marks)
- (iv) If the p-value is 0.001 and the standard error of the difference is 1.1861, whether there is a statistically significant difference between the ROEs of the two industries at 5% level of significance based on,
- (a) *p*-value.
- (b) Confidence interval.
- (c) *t*-statistic.

(3 Marks)

(Total: 14 Marks)

- (4) (A) List two preconditions necessary for conducting an ANOVA test. (2 Marks)
- (B) State a real-world situation relating to accounting or finance where you would choose to apply ANOVA technique and explain why you choose ANOVA rather than another statistical technique. (2 Marks)
- (C) Why do we have to generally conduct a post hoc test together with ANOVA? (2 Marks)
- (D) The following table contains information on a certain measurement relating to three independent groups.

	Group A	Group B	Group C
Mean	10	5	4
<i>n</i>	7	9	10
Sum of Squares	22	66	34

You are required to,

- (i) Calculate the grand mean. (1 Mark)
- (ii) Calculate between group sum of squares (SSB) and within group sum of squares (SSW). (2 Marks)
- (iii) Calculate between group degrees of freedom and within group degrees of freedom. (2 Marks)
- (iv) Calculate between group mean squares (MSB) and within group mean squares (MSW). (1 Mark)

- (v) Calculate the F statistic. (1 Mark)
- (vi) If the critical F statistic is 3.42, state your conclusion as far as possible in plain English understandable to general audience. (1 Mark)

(Total: 14 Marks)

- (5) (A) Explain the purpose of correlation analysis. (2 Marks)
- (B) Explain the difference between correlation and causation using an example. (2 Marks)
- (C) Draw a scatter plot showing a weak negative correlation. (2 Marks)
- (D) The following results relating to a statistical test has been provided to you.

Descriptive Statistics				Correlations		
	Mean	Std. Deviation	N		X	Y
X	31.1000		10	X	1	
Y	128.2000		10	Pearson Correlation		.000
				Sig. (2-tailed)		
				Sum of Squares and Cross-products	3456.900	2808.800
				Covariance		
				N	10	10
				Y		1
				Pearson Correlation		.000
				Sig. (2-tailed)		
				Sum of Squares and Cross-products	2808.800	2791.600
				Covariance		
				N	10	10

You are required to,

- (i) Calculate the covariance between X and Y. (1 Mark)
- (ii) Calculate the Pearson correlation coefficient between X and Y. (2 Marks)
- (iii) Based on the given results and your calculations, state your conclusion as far as possible in plain English understandable to general audience. (2 Marks)
- (E) Clearly state your step-by-step interpretations in a proper order for the following results relating to a regression analysis.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.993 ^a	.986	.982	2.36133

a. Predictors: (Constant), X2, X1

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2752.569	2	1376.284	246.829	.000 ^b
	Residual	39.031	7	5.576		
	Total	2791.600	9			

a. Dependent Variable: Y

b. Predictors: (Constant), X2, X1

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	115.184	1.974		58.345	.000
X1	.779	.040	.867	19.328	.000
X2	-.802	.087	-.412	-9.185	.000

a. Dependent Variable: Y

(3 Marks)
(Total: 14 Marks)

Table entry for p and C is the critical value t^* with probability p lying to its right and probability C lying between $-t^*$ and t^* .

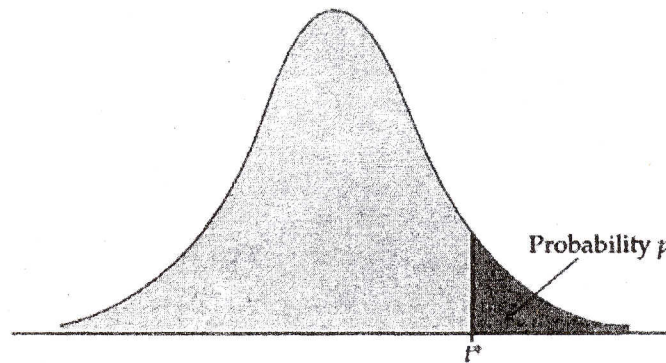


TABLE D

t distribution critical values

df	Upper-tail probability p											
	.25	.20	.15	.10	.05	.025	.02	.01	.005	.0025	.001	.0005
1	1.000	1.376	1.963	3.078	6.314	12.71	15.89	31.82	63.66	127.3	318.3	636.6
2	0.816	1.061	1.386	1.886	2.920	4.303	4.849	6.965	9.925	14.09	22.33	31.60
3	0.765	0.978	1.250	1.638	2.353	3.182	3.482	4.541	5.841	7.453	10.21	12.92
4	0.741	0.941	1.190	1.533	2.132	2.776	2.999	3.747	4.604	5.598	7.173	8.610
5	0.727	0.920	1.156	1.476	2.015	2.571	2.757	3.365	4.032	4.773	5.893	6.869
6	0.718	0.906	1.134	1.440	1.943	2.447	2.612	3.143	3.707	4.317	5.208	5.959
7	0.711	0.896	1.119	1.415	1.895	2.365	2.517	2.998	3.499	4.029	4.785	5.408
8	0.706	0.889	1.108	1.397	1.860	2.306	2.449	2.896	3.355	3.833	4.501	5.041
9	0.703	0.883	1.100	1.383	1.833	2.262	2.398	2.821	3.250	3.690	4.297	4.781
10	0.700	0.879	1.093	1.372	1.812	2.228	2.359	2.764	3.169	3.581	4.144	4.587
11	0.697	0.876	1.088	1.363	1.796	2.201	2.328	2.718	3.106	3.497	4.025	4.437
12	0.695	0.873	1.083	1.356	1.782	2.179	2.303	2.681	3.055	3.428	3.930	4.318
13	0.694	0.870	1.079	1.350	1.771	2.160	2.282	2.650	3.012	3.372	3.852	4.221
14	0.692	0.868	1.076	1.345	1.761	2.145	2.264	2.624	2.977	3.326	3.787	4.140
15	0.691	0.866	1.074	1.341	1.753	2.131	2.249	2.602	2.947	3.286	3.733	4.073
16	0.690	0.865	1.071	1.337	1.746	2.120	2.235	2.583	2.921	3.252	3.686	4.015
17	0.689	0.863	1.069	1.333	1.740	2.110	2.224	2.567	2.898	3.222	3.646	3.965
18	0.688	0.862	1.067	1.330	1.734	2.101	2.214	2.552	2.878	3.197	3.611	3.922
19	0.688	0.861	1.066	1.328	1.729	2.093	2.205	2.539	2.861	3.174	3.579	3.883
20	0.687	0.860	1.064	1.325	1.725	2.086	2.197	2.528	2.845	3.153	3.552	3.850