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(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

UNIVERSITY EXAMINATIONS

2021/2022 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER EXAMINATIONS

MAIN EXAMINATION

FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN EDUCATIONAL PLANNING/EDUCATIONAL MANAGEMENT AND POLICY STUDIES/ECONOMICS OF EDUCATION

COURSE CODE: EPM 902

COURSE TITLE: ADVANCED QUANTITATIVE DATA ANALYSIS

DATE: 21/04/2022   **TIME:** 1400-1700 HOURS

INSTRUCTIONS TO CANDIDATES
Answer ANY THREE Questions

TIME: 3 Hours

MMUST observes ZERO tolerance to examination cheating

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QUESTION ONE

a) Examine three strengths of quantitative research   (6marks)

b) A researcher seeks to establish the effect of recipient's SES on overall loan allocation. The results are presented in Table 1

Table 1: The Effect of Recipient's SES on Loan Allocation as Measured by Multiple Linear Regression

Variable	Variable label	Model 1 (m415)	Model 2 (m415)
		Coefficient	Coefficient
pcases5	Socio-economic status Lowest SES quintile (Ref.)		
	Low SES quintile	-15823.9* (-6423.8)	-10144.4* (-3944.6)
	Middle SES quintile	-11785.9† (-6528.3)	-12449.1** (-4124.9)
	High SES quintile	-11128† (-6110.8)	-15390.1*** (-4218.3)
	Highest SES quintile	-8537.1 (-6544.1)	-10089.2* (-4279.6)
m311	Loan recipient's both parents are alive	-2794.7 (-7911.8)	-5963.2 (-5005.7)
m314	Loan recipient's both parent are dead	-16335.3 (-29234.6)	-6476.2 (-19066.3)
m315	Loan recipient's parents are divorced	10545.7 (-11696.7)	364.8 (-8874.1)
m32	Loan recipient's father is alive	-11894.6 (-10806)	-5988.6 (-7713.8)
m331	Loan recipient's father did not attend school	11434.1† (-6921.6)	9519.8* (-4686.1)
m34	Loan recipient's mother is alive	-10142.7 (-8856.1)	-12762.1* (-5538.3)
m381	Guardian is responsible for loan recipient's university education	11293.9 (-10206.8)	11748.4† (-6502.7)
m513	Loan recipient attended government primary school	-9521.0* (-4413.8)	-6672.8* (-2718.7)
m531	Loan recipient's university is Moi	8211.2 (-7057.5)	9160.2* (-4248.4)
m532	Loan recipient's university is Nairobi	-1289.9 (-6879.6)	705.6 (-4077.6)
m541	Loan recipient's field of study is arts	3379.5 (-4991.1)	4593 (-3159.5)
Constant		182257.8***(14233.1)	39124.1*** (-9643.7)
N		383	383
F-statistic		$(F(20, 362)=3.06^{***})$	$(F(21, 361)=53.02^{***})$
R^2		0.131	0.661
Adjusted R^2		0.083	0.641
Root Mean Squared Error (RMSE)		36989.4	23152.3

Note. Robust standard errors in parentheses; RMSE=Standard deviation of the regression model (the closer to zero better the fit); †$p<.10$ *$p<.05$, **$p<.01$, ***$p<.001$

i) State the research hypothesis to be tested   (1mark)

ii) Explain three assumptions that the researcher had to meet to use the test statistic   (3 marks)

iii) Report the findings in APA format   (10 marks)

QUESTION TWO

a) Assess the circumstances under which a researcher may opt for a mixed method research

(6 marks)

b) A researcher is interested in how variables, such as GRE (Graduate Record Exam scores), GPA (grade point average) and prestige of the undergraduate institution, affect admission into graduate school. He collects data on these variables and uses a logistic regression to analyse the data. The results of the logistic regression are presented below.

Classification Table[a]

			Predicted		
			admit		Percentage Correct
Observed			0	1	
Step 1	admit	0	254	19	93.0
		1	97	30	23.6
	Overall Percentage				71.0

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	gre	.002	.001	4.284	1	.038	1.002
	gpa	.804	.332	5.872	1	.015	2.235
	rank			20.895	3	.000	
	rank(1)	1.551	.418	13.787	1	.000	4.718
	rank(2)	.876	.367	5.706	1	.017	2.401
	rank(3)	.211	.393	.289	1	.591	1.235
	Constant	-5.541	1.138	23.709	1	.000	.004

a. Variable(s) entered on step 1: gre, gpa, rank.

i)   State the null hypothesis to be tested   (1 mark)

ii) Justify the choice of the test statistic by the researcher   (2 marks)

iii) Report the researchers findings in APA format   (9 marks)

iv) Based on the results, what recommendation would you make   (2 marks)

QUESTION THREE

a) Give two advantages of testing a null hypothesis on a two tail test   (2 marks)

b) Explain four applications of the normal curve in statistics   (8 marks)

c) Table 2 and 3 shows statistics on vehicle country of origin and vehicle weight

Table 2

Group Statistics

	ORIGIN Country of Origin	N	Mean	Std. Deviation	Std. Error Mean
WEIGHT Vehicle Weight (lbs.)	2 European	73	2431.49	490.884	57.454
	3 Japanese	79	2221.23	320.497	36.059

Table 3

Independent Samples Test

		Levene's Test for quality of Variance		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
WEIGHT Vehic Weight (lbs.)	Equal varianc assumed	18.242	.000	3.150	150	.002	210.27	66.756	78.362	342.169
	Equal varianc not assumed			3.100	122.367	.002	210.27	67.832	75.990	344.541

i) State the null hypothesis to be tested (2 marks)

ii) Report the researchers findings in APA format (4 marks)

iii) Based on the results, what recommendation would you make? (2 marks)

iv) Operationalize the study variables to allow use of an equivalent non-parametric test statistic (2 marks)

QUESTION FOUR

a) Discuss the importance of a researcher understanding of the following concepts in statistics

  i) Statistical inference (2 marks)

  ii) Sampling distribution of a mean (2 marks)

  iii) Standard Error of the mean (2 marks)

  iv) Margin of error (2 marks)

  v) Confidence interval (2 marks)

b) An online retailer wants to get the best from its employees, as well as improve their working experience. Currently, employees in the retailer's order fulfilment centre are not provided with any kind of entertainment whilst they work (e.g., no background music, television, etc.). However, the retailer wants to know whether providing music, which a few employees have requested, would lead to greater productivity, and if so, by how much. Therefore, the researcher recruited a random sample of 60 employees. This sample of 60 participants was randomly split into three independent groups with 20 participants in each group: (a) a "control group" that did not listen to music; (b) a "treatment

group" who listened to music, but had no choice of what they listened to; and (c) a second treatment group who listened to music and had a choice of what they listened to. The experiment lasted for one month. At the end of the experiment, the "productivity" of the three groups was measured in terms of the "average number of packages processed per hour".

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Kruskal-Wallis equality-of-populations rank test
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Music	Obs	Rank Sum
No music	20	445.50
Music - No	20	600.00
Music - Ch	20	784.50

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chi-squared =       9.444 with 2 d.f.
probability =       0.0089
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chi-squared with ties =       9.470 with 2 d.f.
probability =       0.0088
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i) State the null hypothesis to be tested (1 mark)

ii) Justify the choice of the test statistic by the researcher (2 marks)

iii) Report the researchers findings in APA format (5 marks)

iv) Based on the results, what recommendation would you make? (2 marks)