



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2014/2015

INSTITUTIONAL BASED PROGRAMME (IBP) AUGUST 2014 SESSION

EXAMINATION FOR THE DEGREE OF MASTER OF ARTS

AGE 802: ADVANCED QUANTITATIVE TECHNIQUES IN GEOGRAPHY

DATE: TUESDAY, 30TH DECEMBER 2014

TIME: 9.00 A.M. – 12.00 P.M.

INSTRUCTIONS ANSWER QUESTION 1 AND ANY THREE QUESTIONS. USE
ILLUSTRATIONS WHERE APPROPRIATE

QUESTION 1

A. Illustrate the relevance of the concepts below in statistical prediction:

- 1) Partial and multiple correlation. (2 marks)
- 2) Estimation and simulation (2 marks)
- 3) Theory testing and modeling (2 marks)
- 4) Pearson R^2 and Pseudo R^2 (2 marks)

B. What information do the coefficient of determination and the F test provide on the reliability of a prediction model? Compute and discuss those statistics based on the ANOVA table below. (8 marks)

Regression Attributes	SSR (for R^2)	df	RMS (for F test)
Explained variance	89.82	1	89.82
Residual Variance	70.90	33	2.15
Total Variance	160.72	34	

C. Using data in Appendix 1 predict the Probability of Survival (s) of the less than 1 year by assuming that it depends on the number of Births (B) and Deaths (D). (6 marks)

QUESTION 2

- A. Determine the normality of the distributions of males, females, births and deaths in Appendix 1. (8 marks)
- B. What are the causes and impacts of autocorrelation and multicollinearity in a prediction model? How do you assess them? (8 marks)

QUESTION 3

- A. Plot data on the Probability of Survival (s), Births (B) and Deaths (D) in a scatter graph (Appendix 1). Determine the outliers and their effect on the prediction of the Probability of Survival(s) by Births (B) and Deaths (D). (8 marks)
- B. How useful is Levene's test in statistical prediction? Illustrate your answer using appropriate significance level. (8 marks)

QUESTION 4

- A. Indicate the most significant parameters in Appendix 2 and provide a substantial interpretation of the results. (8 marks)
- B. What are the advantages of a linear model compared to nonlinear ones? How do you translate a nonlinear model into a linear one and interpret the results? Illustrate your answer. (8 marks)

QUESTION 5

- A. What issues does the regression of time series poses to forecast and modeling? Use appropriate relations and graphs to illustrate your answer. (8 marks)
- B. What is the relevance of the Principal Component Analysis in predicting climate change? How do you interpret its results. (8 marks)

APPENDIX 1: POPULATION PROJECTIONS FOR BWATHONARO (2015)

Age Bracket	Males (M)	Females (F)	Births (B)	Deaths (D)	Fecundity rate (f)	Probability of survival (s)
Below 1	2886	2749		6588		
1-4	2320	2257		3269		
5-9	2315	2291		2566		
10-14	1919	1926		1535		
15-19	968	1174		991	0.120	0.911
20-24	1123	1195	6588	378	0.135	0.906
25-29	1024	1036	3269	317	0.267	0.885
30-34	827	1018	2566	173	0.186	0.878
35-39	1144	1130	1535	141	0.135	0.845
40-44	1022	983	991	84	0.093	0.821
45-49	792	770	378	14	0.051	0.800
50-54	376	238	317			
55-59	105	86	173			

Source: Luwesi, C.N. (2013). A Climate Proof Response-Capability for Green Water Saving and Agriculture Resilience in Semi-Arid Watersheds of the Eastern Region, Kenya (PhD Thesis). Nairobi: Department of Geography, School of Pure and Applied Sciences, Kenyatta University

APPENDIX 2: LIVESTOCK MANAGEMENT PRACTICES IN KITUI COUNTY

Parameter	Breed of Poultry ^a		Method of Feeding Poultry ^b		Method of Feeding Cows ^c	
	t	Sig	t	Sig	t	Sig
Edu_Level	8.833	0.000	3.663	0.000	0.347	0.729
HHD_LessSixty	-2.19	0.029	0.619	0.536	-1.175	0.240
HHD_Type	1.047	0.296	0.390	0.696	1.599	0.110
Advise_Ext	-0.756	0.450	3.782	1.131	-3.200	0.001
Extraland	-1.879	0.061	0.553	0.580	-0.400	0.689

Source: Mutiso (2013). Poverty-Environment Nexus Survey in Kitui County (PhD study)

Notes:

^a $R^2 = 0.070$ (Adjusted $R^2 = 0.005$); $F = 1.073$; $Sig. = 0.373$

^b $R^2 = 0.088$ (Adjusted $R^2 = 0.023$); $F = 1.360$; $Sig. = 0.063$

^c $R^2 = 0.097$ (Adjusted $R^2 = 0.033$); $F = 1.519$; $Sig. = 0.058$