

KABARAK



UNIVERSITY

**UNIVERSITY EXAMINATIONS
2009/2010 ACADEMIC YEAR
FOR THE DEGREE OF BACHELOR OF SCIENCE IN
ECONOMICS AND MATHEMATICS**

COURSE CODE: MATH 328

**COURSE TITLE: REGRESSION ANALYSIS AND ANALYSIS
OF VARIANCE**

STREAM: Y3S2

DAY: TUESDAY

TIME: 9.00 – 11.00 A.M.

DATE: 01/12/2009

INSTRUCTIONS:

- Answer question **ONE** and any other **TWO** questions
- Begin each question on a separate page
- Show your workings clearly and orderly

PLEASE TURN OVER

QUESTION ONE (20 MARKS)

- a) Define the following terms;
- i) Correlation coefficient (2 marks)
 - ii) Rank correlation (3 marks)
 - iii) Regression Analysis (3 marks)
- b) Differentiate between
- i) One way ANOVA and Two way ANOVA (2 marks)
 - ii) Simple linear regression and multiple regression (2 marks)
- c) Write the equation of the multiple regression linear model in exact linear form and stochastic form for the case of;
- i) 4 independent or explanatory variables (4marks)
 - ii) k independent or explanatory variables (4marks)
 - iii) Why would you expect most observed values of Y not to fall exactly on a straight line (2 marks)
- e) The ranks of the same 15 students in two subjects A and B are given below; the two numbers within the brackets denoting the ranks of the same student in A and B respectively. (1,10), (2,7), (3,2), (4,6), (5,4), (6,8), (7,3), (8,1), (9,11), (10,15), (11,9), (12,5), (13,14), (14,12), (15,13). Find the rank correlation coefficient (8 marks)

QUESTION TWO (20 MARKS)

The annual sales revenue (in Ksh) of a product as a function of sales force (Number of salesperson) and annual advertising expenditure (in Ksh) for the past 10 years are summarized below;

Annual sale revenue (Y)	Sales force (X_1)	Annual Advertising expenditure (X_2)
20	8	28
23	13	23
25	8	38
27	18	16
21	23	20

29	16	28
22	10	23
24	12	30
27	14	26
35	20	32

Design a regression model to forecast the annual sales revenue of the product using matrix method.

QUESTION THREE (20 MARKS)

Five doctors each test treatments for a certain disease and observe the number of days each patient takes to recover. The results are (recovery time in days) given below;

Doctors	Treatments				
	1	2	3	4	5
1	10	14	23	18	20
2	11	15	24	17	21
3	9	12	20	16	19
4	8	13	17	17	20
5	12	15	19	15	22

Discuss the difference between doctors and treatments at 5% level of significance.

QUESTION FOUR (20 MARKS)

The table below gives the per capita GDP to the nearest \$100(Y) and the percentage of the economy represented by Agriculture (X_1) and the male literacy rate (X_2) reported by World Bank Development Indicators for 1999 for 15 Latin Americans countries.

Country	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Y_i	76	10	44	47	23	19	13	19	8	44	4	31	24	59	37
X_1	6	16	9	8	14	11	12	10	18	5	26	8	8	9	5
X_2	97	92	85	96	91	83	93	81	74	93	67	92	94	97	93

- (i) Find the least squares regression equation of Y on (X_1) and (X_2) and interpret the results **(10 Marks)**
- (ii) Test at the 5% level for the statistical significance of the slope parameters **(10 marks)**

QUESTION FIVE (20 MARKS)

- a) For purpose of estimating this years inventory a computer company samples 6 dealers in each case getting figures for both this years and last years

Inventory last years(X)	Inventory this year(Y)
70	60
260	320
150	230
100	120
20	50
60	60

- i) Draw a scatter diagram for the above data **(3 marks)**
- ii) Find the regression equation **(6marks)**
- iii) Plot the regression line and show the deviations of actual values from the estimated values **(3marks)**
- iv) Test at the 5% level of significance for the statistical significance for the parameters **(8marks)**
- v) Find the correlation coefficient **(4marks)**
- vi) Find the coefficient of determination **(2marks)**