CHUKA UNIVERSITY

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN ECONOMICS AND STATISTICS, BACHELOR OF ARTS (ECONOMICS AND MATHEMATICS) AND BACHELOR OF ECONOMICS AND SOCIOLOGY)

ECON 235: ECONOMIC STATISTICS II

STREAMS: **TIME: 2 HOURS**

DAY/DATE: TUESDAY 10/04/2018 **2.30 P.M – 4.30 P.M**

INSTRUCTION:

- **Answer question one and any other two questions from the remaining**

1. You have been commissioned to investigate the relationship between the birth weight of newborn females and the number of prenatal visits to a physician or midwife that their mothers made during pregnancy. The dependent variable is "bwght" the birth weight of the 1st prenatal visits new born female measured in grams. The explanatory variable is 'pnvisits', the number of prenatal visits of the 1st newborns mother during pregnancy, measured in number of visits. The model you proposed to estimate is given by the population regression equation:

$bwght_i = \beta_0 + \beta_1\ pnvisits_i + \mu_i$

Your research assistant has used 857 sample observations on "bwght", and "pnvisits" to estimated the following OLS simple regression equation, where the figures in the parentheses below the co-efficient estimates are the estimated standard errors of the co-efficient estimates.

$bwght_i$ = 3199.02 + 14.1219 $pnvisits_i + \bar{\mu}_i$

Se (65.6909) (5.36347)

I= (1,2 …..N)

N = 857

(i) Perform a test of the null hypothesis H_0: β_1 =0 against the alternative hypothesis H_0: β_1, $\neq$ 0 at 1% level of significance (i.e α = 0.01) Show how you calculated the test statistic. State the decision rule you use and the inferences you would draw from the test. What would you conclude from results of the test? [15marks]

(ii) Compute 95% confidence interval for the intercept co-efficient β_0 . Use the confidence interval to test the hypothesis that the mean birth weight of newborn females whose mothers made no prenatal visits to a physician or midwife equals 3,000 grams . State the null hypothesis H_0 and the decision you use and the inference you would draw from the test. [15marks]

2. (i) Briefly describe chi-square (x^2) test statistic . [2marks]

(ii) State the steps involved in finding the value of chi-square (x^2) . [4marks]

(iii) What are the areas of application of chi-square test. [4marks]

(b) Two research workers classified some people in income groups on the basis of sampling studies. Their results were as follows;

Investigators	Income groups			
	poor	Middle	Rich	Total
A	160	30	10	200
B	140	120	40	300
Total	300	150	50	500

Show that the sampling techniques of atleast one research worker is defective. [10marks]

3. Consider the following data showing a firms advertisement expenditure (x) and his sales revenue (Y) for a period 1987 – 1994.

Year	1987	1988	1989	1990	1991	1992	1993	1994
Advert.exp	35	80	55	70	88	100	90	75
Sales revenue	25	35	28	40	40	50	45	60

To study the effect of advertisement expenditure on sales revenue a researcher specified the following regression model:

$Y_i = \beta_0 + \beta_1 x_i + e_i$

(i) Use the data given above to obtain least square estimates of $\hat{\beta}_0$and $\hat{\beta}_1$ interpret the co-efficient in the model given above. [10marks]

(ii) Draw a scatter diagram and the regression line or line of best fit. [5marks]

(iii) Predict the value of sales revenue when advertisement expenditure is zero. [2marks]

(iv) Briefly describe regression. [3marks]

4. (a) (i) Briefly describe binomial distribution. [2marks]

(ii) State three main features of a Bernoulli process. [3marks]

(b) Four coins are tossed at a time 208 times. Number of heads observed of each throw is recorded and the results are as follows:

No.of heads at a throw	0	1	2	3	4
Frequency	5	48	112	35	8

Fit a binomial distribution to the data given above. [7marks]

(c) Suppose a manufactured product has two defects unit of product inspected . Use Poisson distribution and calculate the probabilities of finding a product without any defect, with three defects and with four defects. [8marks]

5. (i) Set up an analysis of variance table (ANOVA) for the following per acre production data for three varieties of wheat each grown on four plots and state if the variety differences are significant.

Variety	Output			
A	6	7	3	8
B	5	5	3	7
C	5	4	3	4

(ii) Briefly discuss analysis of variance (ANOVA) [5marks]

6. Ten entries are submitted for competition. Three judges study each entry and list the ten in rank order. Their ranking's were as follows:

Entry	A	B	C	D	E	F	G	H	I	J
Judge 1	9	3	7	5	1	6	2	4	10	8
Judge 2	9	1	10	4	3	8	5	2	7	6
Judge 3	6	3	8	7	2	4	1	5	9	10

Calculate the appropriate rank correlation to help you answer the following questions.

(i) Which pair of judges agrees the most. [10marks]

(ii) Which pair of judges disagrees the most. [10marks]
