

KENYA METHODIST UNIVERSITY
END OF SECOND TRIMESTER 2006/2007 EXAMINATIONS

FACULTY : **SCIENCES**
DEPARTMENT : **MATHEMATICS AND COMPUTER SCIENCE**
COURSE CODE : **MATH 134**
COURSE TITLE : **INFERENCE STATISTICS**
TIME : **3 HRS**

Instructions:

- Answer question 1 (compulsory) and any other 2 questions.

Question 1

- a) Briefly explain the steps used in testing of hypothesis. (5 mks)
- b) For the purpose of calculating the dosage for a certain disease, a doctor uses the normal distribution for adult patients with mean 150 and standard deviation 20 pounds. To check this claim, 49 patients were randomly selected and weighed; calculate probability of patients in that sample that:
- i) Weigh less than 148 pounds
 - ii) Between 145 and 176 pounds. (5 mks)
- c) An assembly operation in a manufacturing plant requires approximately a 1 month training period for a new employee to reach maximum efficiency. A new method of training was suggested and a test was conducted to compare the new and standard methods. Two groups of nine new employees were trained for a period of 3 weeks, one group using the new method and the other using the standard method. The length of time (in minutes) required for each employee to assemble the devices was recorded at the end of 3 weeks period.

Standard method	32	27	35	28	41	44	35	31	34
New method	35	31	29	25	34	40	27	32	31

At 5% level of significance, is there sufficient evidence to indicate a difference in true mean times for the two methods? (7 mks)

- d) The data below gives the values for 12 births of the birth weight (x) and the increase in weight between 70 and 100 of life, expressed as a percentage of the birth weight (y).

x (oz)	112	111	107	119	92	80	81	84	118	106	103	94
y (%)	63	66	72	52	75	118	120	114	42	72	90	91

You may use the following totals:

$$\sum x = 1207 \quad \sum y = 975 \quad \sum xy = 94322 \quad \sum x^2 = 123561 \quad \sum y^2 = 86487$$

- i) Calculate the sample correlation coefficient between x and y.
 - ii) Test whether there is a linear correlation between x and y at 10% level of significance. (8 mks)
- e) Differentiate between the terms:
- i) Parameter and statistics.
 - ii) Non parametric and parametric tests. (4 mks)

Question 2

- a) The following sample of 26 measurements was selected from a population that is normally distributed

91	80	99	110	95	106	78	121	106	100	97
82	100	83	115	104	114	118	96	101	79	101
79	130	94	101							

Calculate:

- i) Standard error
- ii) 98% confidence interval for the true mean. (10 mks)

- b) Jane believes that there is no difference in proportions of degrees for both male and female graduates. A random sample of 200 university degrees earned in 2006 gave the following breakdown.

<i>Gender</i>	<i>Degree Earned</i>		
	<i>Bachelor</i>	<i>Masters</i>	<i>Doctorate</i>
Males	100	30	12
Females	40	10	8

Test whether there is a relationship between degree earned and gender at 5% level of significance.

(10 mks)

Question 3

Six samples of each of the four types of cereal grains grown in a certain region were analyzed to determine the thiamine content resulting in the following

Wheat	5.2	4.5	6.0	6.1	6.7	5.8
Barley	6.5	8.0	6.1	7.5	5.9	5.6
Maize	5.8	4.7	6.4	4.9	6.0	5.2
Oats	8.3	6.1	7.8	7.0	5.5	7.2

Carry out analysis of variance and test whether the mean thiamine content for the cereals is the same at 10% of significance.

(20 mks)

Question 4

- a) The percentage of ideal body weight was determined for randomly selected insulin-dependent diabetics. The outcomes are as follows:

107	119	99	114	120	104	124	88
114	116	101	121	152	125	100	95
117							

Construct a 98% confidence interval for variance in the percentage of ideal body weight. (10 mks)

- b) Independent random samples of three different brands of magnetron tubes were subjected to stress testing the number of hours each operated without repair was recorded. Experience has shown that the distributions of life length for manufactured products are often non-normal and thus proper use of an ANOVA f-test.

<i>Brand A</i>	<i>Brand B</i>	<i>Brand C</i>
36	49	7
48	33	31
5	60	140
67	2	59
53	55	42

Use the Kruskal-Wallis H- test to determine whether evidence exists to conclude that the brands of magnetron tubes tend to differ in length of life under stress at 5% level of significance. (10 mks)