



MAASAI MARA UNIVERSITY

**REGULAR UNIVERSITY EXAMINATIONS
2018/2019 ACADEMIC YEAR
THIRD YEAR SECOND SEMESTER**

**SCHOOL OF BUSINESS AND ECONOMICS
BSC. ECONOMICS AND STATISTICS**

**COURSE CODE: ECS 3204
COURSE TITLE: THEORY OF
ESTIMATION**

DATE: 24TH APRIL 2019

TIME: 1430 - 4630 HRS

INSTRUCTIONS TO CANDIDATES

Answer Question **ONE** and any other **THREE** questions

This paper consists of 5 printed pages. Please turn over.

QUESTION ONE

(25 marks)

1. A) Explain each of the following methods of estimation:

- i. Method of moments **(3 marks)**
- ii. Method of likelihood **(3 marks)**
- iii. Method of minimum variance **(3 marks)**

b) Differentiate between each of the following pairs as applied to the theory of estimation

- i. Estimate and estimator **(2 marks)**
- ii. point estimate and interval estimate **(2 marks)**
- iii. Bayesian hypothesis testing and Nyman-Pearson hypothesis testing **(3 marks)**

c) Using diagrams to support your argument statistically evaluate estimation on the basis of:

- i. Biasness **(3 marks)**
- ii. Minimal variance **(3 marks)**
- iii. Consistency **(3 marks)**

QUESTION TWO

(15 MARKS)

i. Using the law of total probability and appropriate diagram to support your answer determine $P(A_i)$ **(3 marks)**

ii. Using the results of 2a above determine the formula for Bayes theorem **(2 marks)**

2b) A manufacturer of VCRs purchases a particular microchip, called the LS- 24, from three suppliers: Hall Electronics, Nakuru Sales and Crawford Components. Thirty percent of the LS - 24 are purchased from Hall Electronics, 20 percent from Nakuru Sales and the remaining 50 percent from Crawford Components. The manufacturer has extensive histories on the three suppliers and knows that 3 percent of the LS - 24 chips from Hall Electronics are defective, 5 percent of chips from Nakuru Sales are defective, and 4 percent of the chips purchased from Crawford Components are defective.

When the LS – 24 chips arrive at the manufacturer, they are placed directly in bin and not inspected or otherwise identified by supplier. A worker selects a chip for installation in a VCR and finds it defective. Determine the probability that it was manufactured by Nakurusales.

(5 marks)

b) From the information in a) above develop a table giving **priori, conditional, joint and posterior** probabilities

(5 marks)

QUESTION THREE

(15 MARKS)

A manufacture of paper used for packing requires a minimum strength of 20kgs per square centimeter. As a check on the quality of the paper, a random sample of ten pieces of paper is selected each hour from the previous hours production and a strength measurement is recorded. For each the standard deviation of the strength measurement computed by pooling the sum of squares of deviation of many samples is known to equal to 2kg per square centimeter. Assuming that the strength measurements are normally distributed.

Determine the probability of $x < 20$ for a random sample of $n=10$ test pieces of papers if given that the mean of the population of strength samples is 21kg per square centimeter.

b) Given a population consisting of three measurements and describe by the probability distribution as shown below.

X	5	3	12
P(X)	1/3	1/3	1/3

Determine

- i. The sampling distribution of the samples means
- ii. The sampling distribution of the median

Assume you are to estimate the 1Q score of the population of University lectures in Kenya. Determine the number of university lectures that you will randomly select if want to be 95% confident that the sample mean is within two 1Q points of the population mean, given the population standard deviation is fifteen.

QUESTION FOUR**(15 MARKS)**

In developing standards for assessing the teaching of precollege science in the county, an experiment was conducted to evaluate a teacher developed modern mathsbased curriculum (MMBC) that was standard based activity oriented

This approach was compared to the traditional historical presentation trough presentation lecture, vocabulary and memorized facts. Students were tested on maths concepts that featured maths knowledge and process skills in the traditional sense. The perhaps not so starting results from a test on maths concepts published on the country journal, teacher, as shown follows

	Mean	Sample Size	Standard Deviation
Pretest MMBC	13.38	372	5.59
Pretest traditional approach	14.06	368	5.45
Post test MMBC	18.5	365	8.03
Post test traditional	16.5	298	6.96

Refund determine

i)The 95% confidence interval estimate for the mean score for the posttest MMBC **(3 marks)**

ii)The point estimate of mean for the traditional approach**(3 marks)**

c)In a study of the relationship birth order and college success a sample of 180 college graduates were firstborn or only children .in a sample of 100 graduates of comparable age and socio economic background , the number of firstborn or only child was 54.

Using 90% confidence interval estimate the difference between the proportions of firstborns or only children in two populations from which these were drawn and interpret yourresults

(5marks)

In an experiment to assess the strength of the hunger drive in rats 30 previously trained animals were deprived of food for 24 hours. At the end of 24 hours period each animal was put into a cage food was dispensed. If the animal pressed a liver, the length of time the animal continued pressing the bar (althoughreceiving no food) was recorded for each animal. If the data yielded

asample mean of 19.3 minutes with a standard deviation of 5.2 minutes, determine the point estimate of true mean time and calculate the margin of error.(5 marks)

QUESTION FIVE

(15 MARKS)

a) When background music was slow the mean amount of bar purchasers for a sample of 17 restaurant patrons werekshs 3047 with standard deviation of ksh 1510.

When the background music was fast, the mean amount of bar purchasers for a sample of 14 patrons in the same restaurant was ksh 21622 with standards deviation of ksh 950. Assuming unequal variances and adjusted degree of freedom for Welch- satterthwaite test, at $\alpha=$

0.01determine if the true mean is higher when the music is low. **(10 marks)**

b) A newly installed automatic gate system was being tested to see if the number of failures, in 1000 entry attempts was the same as the number of failures in 1000 attempts. A random sample of eight delivery trucks was selected for data collection with the results given as per the table below.

Tracks	Entry	Exit
1	43	48
2	45	51
3	53	60
4	56	58
5	61	58
6	51	45
7	48	55
8	44	50

Required

Determine if these sample results show that there is a significant difference between entries and exist gate failures at $\alpha=.0.01$ **(5 marks)**

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