ALUPE UNIVERSITY COLLEGE

...Bastion of Knowledge....

OFFICE OF THE DEPUTY PRINCIPAL

ACADEMICS, RESEARCH AND STUDENTS' AFFAIRS

UNIVERSITY EXAMINATIONS

2019 /2020 ACADEMIC YEAR

...2nd.... YEAR ...2nd...... SEMESTER <u>REGULAR</u> EXAMINATION

FOR THE DEGREE OF BACHELOR OF SCIENCE

ECONOMICS

COURSE CODE: ECO 222

COURSE TITLE: ECONOMIC MATHEMATICS II

DATE:27/10/20   TIME: 9.00AM.-12.00PM

<u>INSTRUCTION TO CANDIDATES</u>

- *Answer Question <u>ONE</u> and any other TWO questions*
- *Question ONE carries 30 marks*
- *Time allowed: 3 hours*

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Question One (30 marks)

1. (a) Distinguish between the following terms as used in statistics.

(i) Type I error and type II error
(ii) Descriptive and inferential statistics
(iii) Null hypothesis and alternative hypothesis
(iv) Statistic and statistics
(v) Sample and population [15Marks]

(b) Describe in detail the steps followed in hypothesis testing. [7 Marks]

(c) State and explain four applications of statistics in social sciences. [8 Marks]

Question Two

(a)   a) The Gaussians distributions (Normal distribution) for random variables tend to have density curves that resemble one another in their physical condition. Explain in details the five main properties underlined in the General Normal Distribution. **(5mks)**

(b)   The monthly food expenditure for a single adult meal at Maasai Mara University has a mean of ksh 480 and a standard deviation of ksh 115. If a random sample size of 60 is drawn using this population, what is the probability that mean expenditure in the sample;

     i)   Lies between 460 and 510   **(5mks)**

     ii)   Exceeds 500   **(5mks)**

(c)   Consider a case in which $\prod \neq 0.5$. suppose we toss a die four times, find the number of proportion distribution in which heads appears as follows;

     (i)   b(0, 4, 1/6)   **(2mks)**

     (ii)   b(2, 4, 1/6)   **(2mks)**

     (iii)   b(1, 4, 1/6)   **(1mks)**

Question Three

(a)   If a manufacturer of panadol tablets asserts that approximately 40% of the total population uses panadol. A sample of 49 people was taken from a population of those using panadol; the proportion of those using panadol is 18. Is the proportion of people using panadol significantly different from the hypothesized population?

                                                            (8mks)

(b)   Suppose we want to know whether fertilizers significantly increase output. We take a sample of 40 fields and we find that the average yield is 50. We take another sample of 40 fields and the average yield is 45. Given the variance for the first field $\delta^2_1 = 100$ and second sample is $\delta^2_2 = 64$. Do fertilizers significantly increase output?

                                                            (8mks)

(c)   Describe the main criterion used in judging estimations in economic statistics .

(6mks)

Question Four

(a)   A component is tested but the test is not infallible. If the component is good 70% of the time test gives positive indication i.e. 70% of the time test gives positive indication. If the component is defective, 80% of the time test gives negative indication denoting that the system is bad. If in the manufacturing process, the percentage of defective component is 20, calculate;

      (i)   Probability that the component is good, and test gives positive indication

(3mks)

      (ii)   Probability that the component is good, and test gives negative indication

(3mks)

      (iii)   Probability that the component is not good, and test gives positive indication

(3mks)

      (iv)   Probability that the component is not good, and test gives negative indication

(2mks)

(b)   Write brief notes on the following aspects as used in economic statistics

      (i)   Significance of the Central Limit theorem   **(3mks)**

      (ii)   Probability under statistical independence   **(3mks)**

      (iii)   Properties of Standard Normal Distribution   **(3mks)**

Question Five

(a)   You roll one red die and one green die. Define the random variables X and Y as follows: X = The number showing on the red die Y = The number of dice that show the number six For example, if the red and green dice show the numbers 6 and 4, then X = 6 and Y = 1.

      i)   Write down a table showing the joint probability mass function for X and Y, find the marginal distribution for Y.   **(6mks)**

ii)   Compute E(Y).   (6mks)

(b)   Suppose we want to find a proportion of students who would like to visit the National library. We sampled 100 students and found that 90% of them would like to visit the library. Construct interval confidence of 95% for the population proportion of students.   (8mks)