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(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF

SCIENCE AND TECHNOLOGY

(MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

MAIN EXAM

2023/2024 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER EXAMINATION

FOR THE DEGREE OF BACHELOR OF SCIENCE (BES AND BEC)

COURSE CODE: ECO 203

COURSE TITLE: **ECONOMICS AND STATISTICS II**

DATE: THURSDAY 18th April 2024 **TIME: 11:30-14:30**

INSTRUCTIONS TO CANDIDATES:

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

Paper Consists of 2 Printed Pages. Please Turn Over

QUESTION ONE (30 Marks)

a) Define the following terms as used in statistics
   i) Sample space
   ii) Sampling frame
   iii) Probability
   iv) Sampling unit
   v) Hypothesis (5 marks)

b) M&M sweets are of varying colours and the different colours occur in different proportions. The table below gives the probability that a randomly chosen M&M has each colour, but the value for tan candies is missing. Given that sweets are randomly selected from a packet. What is the probability of each of the following events?

Colour	Brown	Red	Yellow	Green	Orange	Tan
Probability	0.3	0.2	0.2	0.1	0.1	?

`i. You get a brown one or a red one.
ii. You don't get a yellow one.
iii. You don't get either an orange one or a tan one.
iv. You get one that is brown or red or yellow or green or orange or tan. (8 marks)

c) Describe the sources of non-sampling errors. (6 marks)

d) Compute the p values associated with the following test statistics:

Test Statistic Value	Test Statistic Distribution
1. z=2.68	Standard normal distribution
11. t=1.25	T with 19 degrees of freedom
111.X^2 =7.2	Chi-square with 1 degree of freedom

(3 marks)

e) Differentiate between the following terms as used in statistics
   i) Parameter and Statistic
   ii) Random sampling and Non-random sampling
   iii) Point estimate and interval estimate (6 marks)

f) State the advantages of simple random sampling. (2 marks)

QUESTION TWO

a) Differentiate between type I error and type II error (4 marks)

b) A study was taken to establish whether there is a difference in the mean salaries between the male and female employees. The salaries in Kshs 1000 for the randomly selected employees by gender are shown below. Test the hypotheses $H_0: \mu_1-\mu_2=0$ Vs $H_1: \mu_1-\mu_2 \neq 0$ using $\alpha= 0.05$ significance level.

Male	65 61 45 49 48 46 61 56 48 53 68 48
Female	46 50 39 40 53 49 41 53 43

(9 marks)

QUESTION FIVE

a) A study was made on the amount of converted sugar in a certain process at various temperatures. The data were accorded as follows

Temperature X	Converted sugar
1.0	8.1
1.1	7.8
1.2	8.5
1.3	9.8
1.4	9.5
1.5	8.9
1.6	8.6
1.7	10.2
1.8	9.3
1.9	9.2
2.0	10.5

i) Fit the least squares line to predict the amount of converted sugar from the temperatures (5 marks)

ii) Use the estimated value to test the following hypothesis

H_0: $\beta_0 = 0$

H_1: $\beta_1 \neq 0$

(5marks)

b) An assembly operation in a manufacturing operation in a manufacturing plant requires approximately a 1n month training period for a new employee to reach maximum efficiency. A new method of training was suggested and the test was conducted to compare the new method with the standard procedure. Two groups of 9 new employees were trained for a period of 3 weeks one group using new method and other following the standard procedure. The length of time in minutes required for each employee to assemble the device was recorded at the end of the 3 weeks and the measurements are as given below.

Standard procedure	New procedure
32	35
37	31
35	29
28	25
41	34
44	40
35	27
31	32
34	31

c) State and explain the steps in testing of statistical hypothesis (7 marks)

QUESTION THREE

a) Differentiate between simple random sampling and stratified sampling. (6 marks)
b) The mean height obtained from a random sample of 36 children is 30 inches. The standard deviation of the distribution of height of the population is known to be 1.5 inches. Test the statement that the mean height of the population is 33 inches at 5% level of significance. Also set up 99% confidence interval of the mean height of the population. (8 marks)
c) Describe the procedure for systematic sampling. (6marks)

QUESTION FOUR

a) Differentiate between correlation and regression as used in statistics. (2 marks)
b) The table below shows midterm and final examination test scores for 10 randomly selected students from statistics class, where x denotes the midterm scores and y denotes the final scores.

X	68	87	75	91	82	77	86	82	75	79
y	74	89	80	93	88	79	97	95	89	92

i. Compute the regression line of x and y. (6 marks)
ii. Predict the final scores (y) given that the midterm score is 70. (2 marks)
iii. Find the spearman rank correlation coefficient for the above data. Comment on the strength of the relationship between midterm scores and the final scores. (5 marks)

c) The heights (cm) and weights (kg) of a sample of eight economics students are given below.

Heights (x)	177	163	168	174	184	184	171	173
Weights (y)	71	67	62	73	80	85	69	77

Find the Pearson correlation coefficient between heights and weights. What conclusion can you make? (5 marks)

Did the data provide sufficient evidence to indicate that the meantime for assembling the device at the end of the 3 week period is less for the new training procedure?
(10 marks

Use H_0: $\mu_1 = \mu_2$

H_1: $\mu_1 \neq \mu_2$