CHUKA  **UNIVERSITY**

SUPPLEMENTARY/ SPECIAL EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF
BACHELOR OF SCIENCE, BACHELOR OF EDUCATION, BACHELOR OF ARTS

MATH 343: APPLIED STATISTICS

STREAMS: BSC, BED, BA **TIME: 2 HOURS**

DAY/DATE: THURSDAY 04/02/2021 **11.30 AM – 1.30 PM**

INSTRUCTIONS:

ANSWER ALL THE QUESTIONS

QUESTION ONE

a) A tourist claimed that the mean age of newly married ladies in Naivasha is 16 years. A children's officer took a sample of the newly married ladies in this area and found the following information: 12, 32, 23, 17, 14, 15, 16, 17, 33, and 21. Is there adequate information upon which to conclude with 95% confidence that the mean is actually more than 16 years? (6Marks)

b) A pharmaceutical company has installed a machine which fills automatically 5gms of drug in each phial. A random sample of 16 phials was taken and it was found to contain 5.08 gms on an average in a phial. The standard deviation of the sample was 0.12 gms. Test whether the machine is in order at 5% significance level. (8Marks)

c) Two random samples taken from two normal populations are as follows:

Sample I	20	16	26	27	23	22	18	24	25	19	
Sample II	17	23	32	25	22	24	28	18	31	33	20	27

Estimate the variances of the populations and test whether the two populations have equal variances at alpha= 5% (8Marks)

d) Let X be the IQ scores for a certain population, and that $X \sim N(\mu,100)$. To test $H_0 : \mu = 110$ *vs* $H_1 : \mu > 110$, a random sample of size n = 16 from this population was taken. If a mean $\bar{x} = 113.5$ was observed, Test the null hypothesis at

i. 0.05 level of significance?
ii. Level of significance?
iii. What is the P-value of this test? (8Marks)

QUESTION TWO

The following data represent the age(X_1) and nutrition score(X_2) on health assessment(Y).

Y	X_1	X_2
20	23	3
18	40	4
30	50	3
25	30	1

Required

i. Fit a multiple linear regression model ($Y=\beta_0+ \beta_1X_1+ \beta_2X_2+e$)
ii. Determine variance of β_0, β_1 and β_2
iii. Test hypothesis that (X_1) has no effect on Y (Take alpha=5%)
iv. Test hypothesis that (X_2) has no effect on Y (Take alpha=5%) (10marks)

QUESTION THREE

a) An owner of a bigurm agrees to purchase the products of a factory if the produced items do not have variance of 0.5mm2 in their length. To be sure of the specifications, the buyer selects a sample of 18 items from his lot. The length of each item was measured as follows:

18:57 18:10 18:61 18:32 18:33 18:46
18:12 18:34 18:57 18:22 18:63 18:43
18:37 18:64 18:58 18:34 18:43 18:63

On the basis of the sample data, should the buyer purchase the lot at 5% level of significance? (10marks)

b) Two random samples taken from two normal populations are as follows:

Sample I 20 16 26 27 23 22 18 24 25 19
Sample II 17 23 32 25 22 24 28 18 31 33 20 27

Estimate the variances of the populations and test whether the two populations have equal variances at alpha= 5% (10 marks)
