

CHUKA



UNIVERSITY

## UNIVERSITY EXAMINATION

## RESIT/SPECIAL EXAMINATION

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

**MATH 343: APPLIED STATISTICS****STREAMS:****TIME: 2 HOURS****DAY/DATE: MONDAY 01/11/2021****8.30 A.M – 10.30 A.M****INSTRUCTIONS****ANSWER ALL THE QUESTIONS****QUESTION ONE**

- (a) The following data represent the change (in ml) in the amount of carbon monoxide transfer in smokers with chickenpox over a one week period:

33    2    24    17    4    1    -6

Is there evidence of significant improvement in lung function

- (i) If the data are normally distributed with  $\alpha=10\%$  [4marks]  
 (ii) If the data are normally distributed with  $\alpha$  unknown? [4marks]

- (b) The advisor of Statistics club of a large college believes that the group consists of 10% freshmen, 20% sophomores, 40% juniors and 30% seniors. The membership for the club this year consisted of 14 freshmen, 19sophomores, 51 juniors and 16 seniors. At  $\alpha = 10\%$  test the advisors conjecture.

[7Marks]

- (c) A departmental store A has for competitors; B,C,D & E. Store A hires a consultant to determine if the percentage of shoppers who prefer each of the five stores is the same. A

survey of 1100 randomly selected shoppers is conducted and the results about which one of the stores shoppers prefer are as shown below.

Store	A	B	C	D	E
No. of shoppers	262	234	204	190	210

Is there enough using a significant level of 5% to conclude that the proportions are really the same? [7marks]

(d) 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)

**QUESTION TWO**

a) An owner of a bigurm agrees to purchase the products of a factory if the produced items do not have variance of 0.5mm<sup>2</sup> 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 A study investigating the association between size of cars and country found the following frequency counts

	USA	JAPAN	UK	FRANCE
ECONOMY	21	24	33	55
COMPACT	27	35	37	40
FULL SIZE	36	11	12	4
LUXURY	15	3	7	8

Is there sufficient evidence of a significant relationship between size of car and country? [10marks]

**QUESTION THREE**

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 ( $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + e$ )
  - ii. Determine variance of  $\beta_0$ ,  $\beta_1$  and  $\beta_2$
  - 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)
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