CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATION
RESIT/SUPPLEMENTARY / SPECIAL EXAMINATIONS FOR THE AWARD OF BACHELOR OF SCIENCE IN ACTURAL MATHEMATICS

MATH 244: STATISTICAL INFERENCE

STREAMS: BSc ACTM **TIME: 2 HOURS**

DAY/DATE: TUESDAY 04/05/2021 **08.30 A.M - 10.30 A.M.**

INSTRUCTIONS

- Answer ALL Questions.

QUESTION ONE [30 MARKS]

a) State three properties of estimators and state how each is measured. (6 marks)

b) Define the following terms, stating an example of each:

i) Point estimator

ii) Interval estimator

iii) Sign test statistics (6 marks)

c) A machine produces bolts which are ~ N(4, 0.09), where measures are in mm. Bolts are measured accurately and any which are found to be smaller than 3.5mm or bigger than 4.4mm are rejected. Out of a batch of 500 bolts, how many would be acceptable? (8 marks)

d) In late December 2010 and January 2011, Kwenzu township suffered the worst floods in recent history. It caused disruption to not only the Kwenzu businesses but also the surrounding cities. A survey was conducted among 1500 medium or large businesses with more than 50 employees nationwide. 150 of the surveyed businesses said that their businesses experienced disruptions or closed.

i) What is the point estimate of the population?

ii) Estimate the confidence interval with 95% confidence the proportion of all nation-wide businesses that experienced some disruption or closure due to the floods. (10 marks)

QUESTION TWO [20 MARKS]

a. The following were observations recorded relating to gender performance in a weight loss activity. The pattern of activity outcomes were as follows:

	Male	Female
Pass	7	11
Fail	13	9

a) Formulate the appropriate hypotheses

b) Test whether there is an association between gender and the weight loss activity performance at 1% significance level. (10 Marks)

b. Disruptive behavior among adolescents is linked to high ergic tension. It is known from passed tests that average adolescents have a mean of 36 on a personality test designed to measure ergic tension. A randomly selected sample of 20 adolescents who had been previously diagnosed as conduct disorders produced the following results on a personality test, (High scores reflect high ergic tension).

28 32 53 41

59 25 37 41

41 47 43 37

38 40 35 39

40 42 34 48

a) What is the most appropriate hypothesis test to employ in this study, the z test or the one-sample t test? State a reason for your choice. State the hypothses.

b) Setting $\square = 0.05$, complete the hypothesis testing procedure.

c) What can you conclude about heightened ergic tension in disruptive adolescents? (10 marks)

QUESTION THREE [20 MARKS]

Resting metabolic rate (RMR) is related with body weight.

Body Weight, X (kg)	57.6	64.9	59.2	60.0	72.8	77.1	82.0	86.2	91.6	99.8
RMR, Y (kcal/24 hrs)	1325	1365	1342	1316	1382	1439	1536	1466	1519	1639

a. State four assumptions made on the error model underlying the linear regression analysis. (4 marks)

b. Find the least squares estimates of the regression coefficients (13 marks

c. Obtain the Linear regression model for the data. (1 mark)

d. Find the Resting Metabolic Rate (RMR) for a person whose body weight is 66.7 kg. (2 marks)

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