UNIVERSITY EXAMINATIONS: 2020/2021

EXAMINATION FOR THE DEGREE OF BACHELOR OF COMMERCE

STA2101: BUSINESS STATISTICS

CMS301-F: ADVANCED BUSINESS STATISTICS

PART TIME

DATE: AUGUST, 2020   **TIME:**

INSTRUCTIONS: Answer **ALL** questions showing all your workings.

QUESTION ONE [25 MARKS]

a) A population consists of three numbers 3, 6 and 9. Consider all possible samples of size two which can be drawn with replacement from the population. Calculate the standard error of the sample means.   [6 Marks]

b) A fair six faced die is thrown 120 times.

     (i)   What is the probability of exactly 32 sixes?   [3 Marks]

     (ii)   What is the $P(between\ 15\ and\ 24)$ sixes inclusive?   [3 Marks]

     (iii)   Determine values of integers m_1 and m_2 such that there will be a 95% probability that there will be between m_1 and m_2 sixes, where m_1, m_2 are on symmetrically opposite sides of the mean.   [4 Marks]

c) Suppose you wish to predict the income of University cafeterias on the basis of (a) floor space (b) number of employees. A sample of 5 cafeterias give you the following data.

Sample number	Income (y) (Ksh)	Floor space(x_1) (000 square feet)	No. of employees (x_2)
1	20,000	10	15
2	15,000	5	8
3	10,000	10	12
4	5,000	3	7
5	10,000	2	10

Calculate the estimated regression equation. [9 Marks]

QUESTION TWO [25 MARKS]

a) The height of students in a certain computer class is distributed with mean μ and standard deviation σ. A random sample of 100 students was taken and the 90% confidence interval for μ was found to be between 175cm and 180cm.

Estimate:

(i) Value of the sample mean; [2 Marks]

(ii) Value of σ. [2 Marks]

(iii) 95% confidence interval for μ. [3 Marks]

b) Are professional jobs held in the computing industry independent of the number of years a person has worked in the industry? Suppose 246 workers are interviewed. Use the results to obtained to determine whether type of professional job held in the computer industry is independent of years worked in the industry. Take $\alpha = 0.01$.

Professional position

Years of experience	Manager	programmer	operator	Systems analysts
$0-3$	6	37	11	13
$4-8$	28	16	23	24
More than 8	47	10	12	19

[10 Marks]

c) Mwanga Digital Company has $5,000$ workers. The company is interested in knowing the average number of digital products bought per week per person by the company's workers. While the quality control manager thinks that the average number of digital products taken per worker per week is 32, the company secretary thinks that the true value should be more. The quality control

manager subsequently selected workers at random and got the following results as digital products taken per week.

12, 4, 17, 10, 3, 20, 16, 12, 9, 18, 12, 21, 7, 13, 16, 17

9, 15, 20, 11, 17, 19, 5, 6, 14, 17, 9, 12, 18, 20, 21, 6

Formulate a suitable hypothesis and test it at 5% level of significance.   [8 Marks]

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