UGANDA MARTYRS UNIVERSITY

UNIVERSITY EXAMINATIONS

FACULTY OF SCIENCE

DEPARTMENT OF NATURAL SCIENCES

YEAR ONE SEMESTER TWO 2022/2023 FINAL ASSESMENT

COURSE CODE : CSC 1204

COURSE UNIT : COMPUTATIONAL STATISTICS **(NKOZI)**

PROGRAM (S) : Bachelor of Science in Information Technology, Bachelor of Computer Science and Diploma in Computer Science

DATE: Friday 26/05/23

TIME: 9.30 - 12.30 pm

DURATION: 3 hours

Instructions:

1. This examination consists of **EIGHT** questions.
2. Attempt any **FIVE** questions. Each question caries 20 marks.
3. Do not write anything on the questions paper.
4. Carefully read through ALL the questions before attempting.
5. No **names** should be written anywhere on the examination booklet.
6. Ensure your work is **clear** and **readable**. Untidy work shall be penalized.
7. Any type of examination Malpractice will lead to automatic disqualification.
8. Ensure that your **Registration number** is indicated on all pages of the examination answer booklet.
9. Remember to indicate the question numbers you have attempted.

QUESTION ONE

(a) What are measures of central tendency as used in statistics? **[1 mark]**

(b) Mention any three measures of central tendency you know. **[3 marks]**

(c) Construct a frequency distribution table for the following figures of weights obtained from 36 elements of mathematics students in Uganda Martyrs University using a class width of 3 and starting with the class 56-58. **[5 marks]**

66	70	68	67	71	60
64	70	68	65	64	61
71	66	67	65	68	59
67	65	68	66	69	58
66	65	65	71	70	56
57	60	62	56	59	72

(d) Using the frequency distribution table above, find the;

(a) Mean weight **[3 marks]**

(b) Modal weight **[4 marks]**

(c) Median weight of the students. **[4 marks]**

QUESTION TWO

(i) Distinguish the following terms as used in statistics.

(a) A sample and a population **[2 marks]**

(b) A parameter and a statistic **[2 marks]**

(ii) Why do you think most researchers choose to use a sample instead of the population in their surveys? **[4 marks]**

(iii) Consider the figures of monthly salaries in dollars extracted from the accounts department of an organization.

440, 430, 515, 420, 490, 438, 435, 438, 500, 510 and 600

Using the data above, find the;

(a) Mean deviation of the data **[4 marks]**

(b) Lower quartile **[3 marks]**

(c) Upper quartile **[3 marks]**

(d) Interquartile range. **[2 marks]**

QUESTION THREE

(a) For a regression line $y = a + bx$, show that;

$$a = \frac{\sum y - b\sum x}{n}$$

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - \left(\sum x\right)^2}$$ **[7 marks]**

(b) A new computer circuit was tested and the times (in micro seconds) required to carry out different subroutines were recorded as follows.

x	1	2	3	4
y	1	5	8	13

(i) Calculate the values of a and b for the given data for the regression line $y = a + bx$ **[6 marks]**

(ii) Hence estimate y when $x = 2.5$ **[2 marks]**

(iii) Sketch the scatter diagram for the data above. **[4 marks]**

(iv) Is there a linear relationship between the variables x and y? **[1 mark]**

QUESTION FOUR

(a) (i) With relevant diagrams (sketches), distinguish between the positive, negative and zero correlation. **[6 marks]**

(ii) Explain the major difference between correlation and regression. **[2 marks]**

(b) The head of statistical data in the mathematics department found the following data after quizzing seven first year students of computational statistics.

Individual	Number of sodas consumed (x)	Number of bathroom trips (y)
Rick	1	2
Janice	2	1
Paul	3	3
Suzan	3	4
Cindy	4	6
John	5	5
Donald	6	5

(c) Compute the Pearson correlation coefficient between the sodas and the visits to the bathrooms as a result of the drinks. **[6 marks]**

Hint: $\gamma = \dfrac{n\sum xy - \sum x \sum y}{\sqrt{\left[\left(n\sum x^2 - \left(\sum x\right)^2\right)\left(n\sum y^2 - \left(\sum y\right)^2\right)\right]}}$

(d) The data given provides scores of a certain class in Mathematics and History tests in percentage:

Mathematics	84	72	67	51
History	16	19	33	19

Calculate the Spearman's correlation between the two test scores. **[6 marks]**

QUESTION FIVE

(a) A discrete random variable X has the following probability mass function.

$$f(x) = \begin{cases} kx, & x = 2,4,6 \\ k(x-2), & x = 7,8 \\ 0, & Otherwise \end{cases}$$

(i) Determine the value of k **[3 marks]**

(ii) Calculate the mean of X. **[3 marks]**

(iii) Find the variance and standard deviation of X. **[4 marks]**

(b) A coin is tossed 10 times. Find the probability that;

(i) Exactly 5 heads will appear. **[3 marks]**

(ii) At least 9 heads will appear **[3 marks]**

(iii) Determine the mean and standard deviation of the number of heads. **[4 marks]**

QUESTION SIX

(a) State the laws of probability. **[2 marks]**

(b) Using relevant examples, write short notes on each of the following ways of measuring probabilities.

(i) Mathematical certainty **[3 marks]**

(ii) Analysis of past experience **[3 marks]**

(iii) Survey studies or research studies. **[4 marks]**

(c) Consider the information given below which considers the number of cars in the kingdom (x) alongside the road accidents occurring y.

x	26	31	35	37	41	44	46	49	53	58
y	138	163	166	153	177	207	216	208	226	238

(i) Plot the scatter diagram. **[4 marks]**

(ii) Obtain the equation of line of regression of y on x. **[4 marks]**

QUESTION SEVEN

(a) The length of a computer power supply cords measured from the end of the cord including bared leads to the face of the attachment plug cap, produced by a machine are normally distributed with mean length of 8.0 m and standard deviation of 2.0 m. Find the probability that the length of a randomly selected power supply cord is

(i) Shorter than 6.4 m **[4 marks]**

(ii) Longer than 11.0 m **[4 marks]**

(b) The time taken by Moses to deliver computers components to Kayabwe computer shop is normally distributed with a mean of 12 minutes and standard deviation of 2 minutes. Moses delivers computer components every day. Estimate the number of days during the year when he takes;

(i) Longer than 17 minutes. **[4 marks]**

(ii) Less than 10 minutes. **[3 marks]**

(iii) Between 9 and 13 minutes. **[4 marks]**

(iv) What advise can you give the owner of the shop? **[1 mark]**

QUESTION EIGHT

The following data shows the marks obtained by all 15 students of year one in computation statistics test marked out of 20 marks.

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
X	6	7	10	12	13	4	8	12	9	11	8	10	5	9	12

Suppose the marks above were sampled from a class of 50 students of year one.

Determine the:-

(i)	Range	**[2 marks]**
(ii)	Variance	**[4 marks]**
(iii)	Standard deviation	**[4 marks]**
(iv)	Mean deviation	**[5 marks]**
(v)	Coefficient of variation	**[4 marks]**
(vi)	Comment on your answers	**[1 mark]**

SUCCESS

STATISTICAL TABLES ARE ATTACHED