



# United International University

School of Science and Engineering

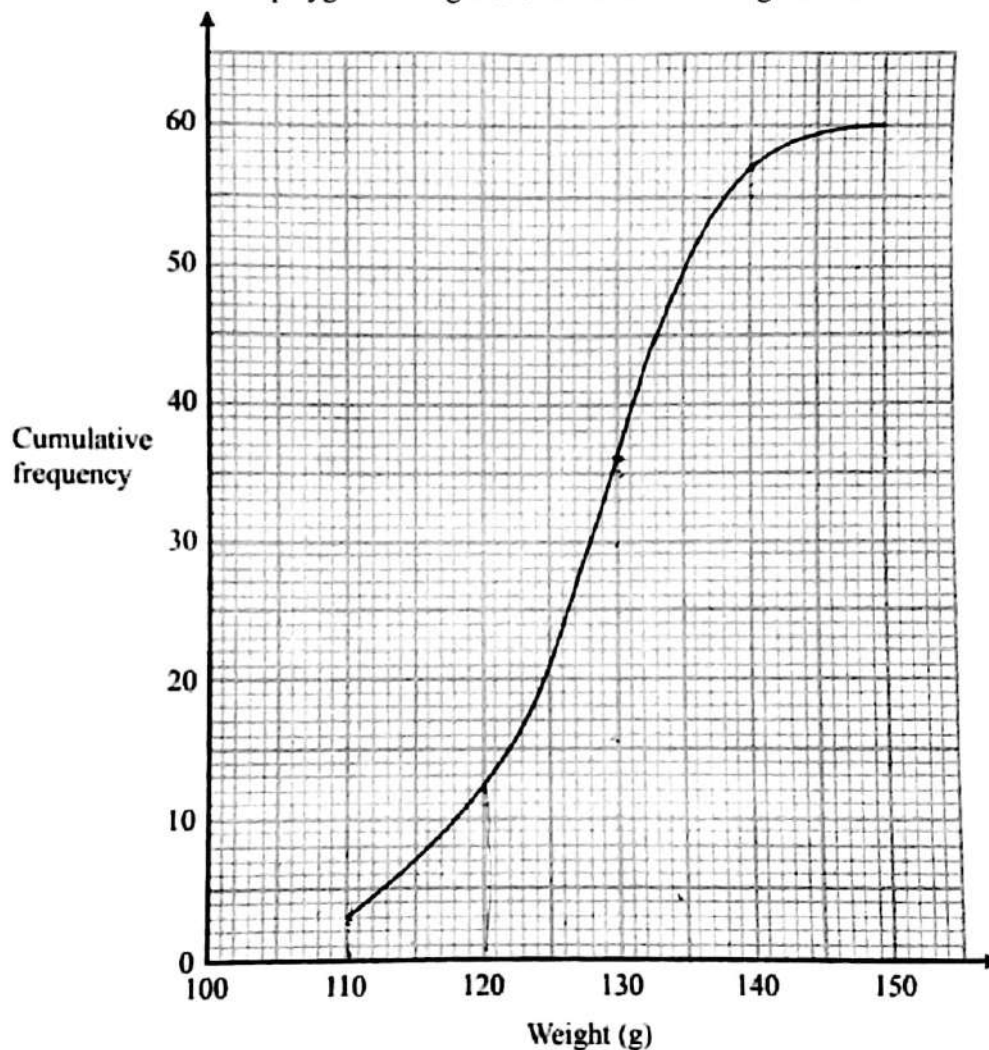
Mid-Term Exam Trimester: Spring 2024

Course Title: Probability and Statistics

Course Code: Math 2205/Stat 205 Marks: 30 Time: 1 Hour 30 Minutes

[You have to answer all the questions]

Q1. The cumulative distribution polygon of weight of a mechanical tool is given below.



- Construct the frequency distribution table and hence find the geometric mean. [4]
- Find the median of weights from the graph. [2]
- Find the standard deviation of the frequency distribution. [2]
- Sketch the histogram and hence the mode of the weights. [3]
- Find the percentage of weights between 120 gram and 130 gram? [2]

- Q2. Consider the following data that represent the numbers obtained by some students in Physics and Mathematics.

Physics	52, 76, 67, 54, 69, 58, 59, 76, 60, 53, 51, 45, 70
Mathematics	63, 75, 51, 69, 71, 52, 77, 59, 68, 81, 48, 54, 69, 43

- (i). Design a back-to-back Stem-Leaf diagram. [2]  
(ii). Describe the consistency of the numbers obtained in the provided subjects. [3]  
(iii). Find the modes of the provided subjects. [1]  
(iv). Sketch the Box-Whisker plot of the Stem-Leaf diagram found in (i). [3]
- Q3. (a) Construct a regression line of  $x$  on  $y$ . Also, from the graph of the regression line predict  $x$  for  $y = 21$ . [4]

$x$	22	18	26	29	19
$y$	13	17	14	11	16

- (b) Consider the regression coefficients  $b_{y/x} = 0.27$  and  $b_{x/y} = 2.41$  to find the  $r_{xy}$ ? [1]
- Q4. A clothing store keeps track of customer purchases. They find that all customers buy at least one shirt. 60% of customers buy more than one item, 30% buy a blue shirt, and 10% buy more than one shirt including a blue shirt. What is the probability a random customer only buys a shirt that is not blue? [3]

$$\text{Correlation coefficient: } r_{xy} = \frac{N \sum xy - \sum x \sum y}{\sqrt{(N \sum x^2 - (\sum x)^2)(N \sum y^2 - (\sum y)^2)}}$$

$$\text{Regression co-efficient: } b_x = \frac{N \sum xy - \sum x \sum y}{N \sum x^2 - (\sum x)^2} \text{ and } b_y = \frac{N \sum xy - \sum x \sum y}{N \sum y^2 - (\sum y)^2}$$

**Formulae:** Regression line:  $\hat{y} = a_0 + a_1x$  for  $a_0 = \frac{\sum y \sum x^2 - \sum x \sum xy}{n \sum x^2 - (\sum x)^2}$  and  $a_1 = \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - (\sum x)^2}$

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Spearman's rank correlation coefficient:  $r = 1 - \frac{6 \sum d_i^2}{n(n^2-1)}$  for  $d_i = x_i - y_i$