United International University

School of Science and Engineering

Department of Computer Science and Engineering

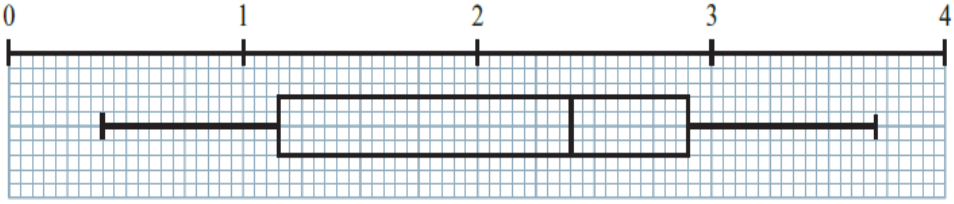
Mid Term Examination Trimester: Spring – 2025

Course: Math -2205 (Probability & Statistics)

Total marks – 30 || Duration – 1 hour 30 minutes

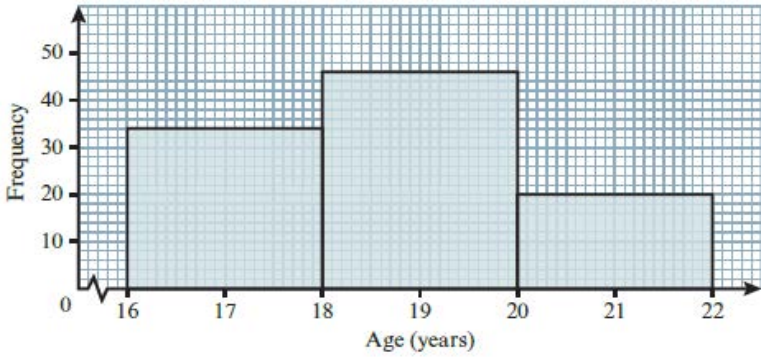
[Note *that the number of marks is given in brackets* [ ] *at the end of each question or part question. You are requested to answer all the questions in order*.]

Q1 **(a)** (i) Find the range and the interquartile range of the dataset represented in the following box plot **[2]**



(ii) What type of skewness would you expect this set of data to have. **[1]**

(b)



Construct the corresponding group frequency distribution for the above histogram. Hence find the mode and the arithmetic mean of the distribution. **[5]**

(c) If the second and fourth Central moment of a distribution is 3 and 27 respectively, find the ***Kurtosis*** and hence state the shape of the distribution. **[2]**

Q2 **(a)** Discuss the strength of correlation from the following Pearson' correlation coefficient. (i) $r = 0.35$ (ii) $r = -1$ **[2]**

(b) A company wants to analyze the relationship between the number of hours studied (x) and the score obtained in a test (y) by 6 students. The data collected are as follows:

Hour Studies (x)	2	3	5	8	9	10
Test Score (y)	65	70	75	85	95	98

(i) Find the value of the coefficient correlation (r) and interpret the result. **[3]**

(ii) Using the method of least squares, find the equation of the linear regression line in the form: $\boldsymbol{y = a + bx}$ **[4]**

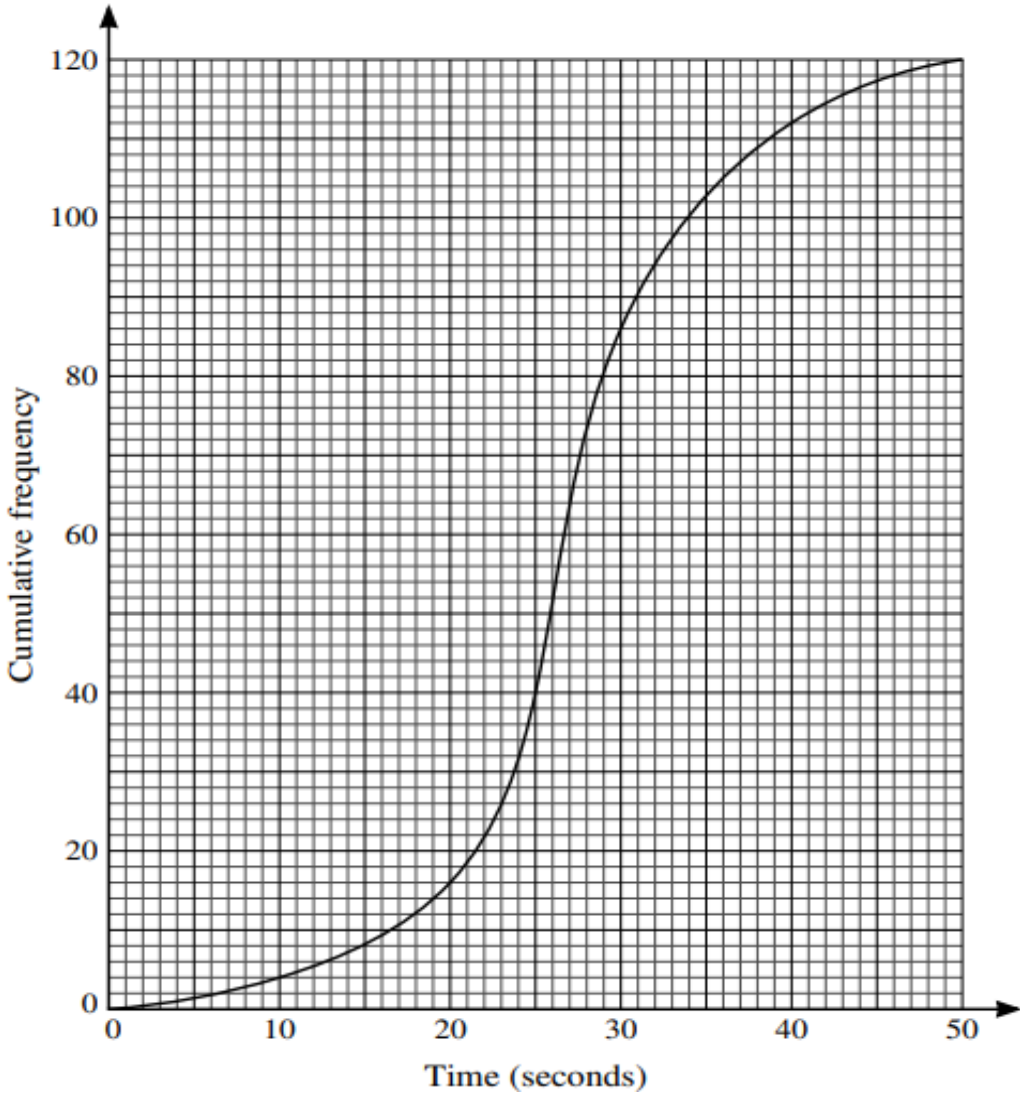
(iii) Estimate the expected score of a student who studies for 6 hours using the regression model. **[1]**

Q3 For the dataset denoted by x in the following table (where k, is a constant) it is given that the arithmetic mean of x *i.e.* $\bar{x} = 9.85$. Find the value of k, and hence calculate the variance of x. **[5]**

(a) .

x	5	7	8	12	20
f	k	$2k$	$k+1$	4	3

(b) The times taken by 120 children to complete a particular puzzle are represented in the following cumulative frequency graph.



(i) Use the graph to estimate the median and 70th percentile. **[2]**

(ii) Find the interquartile range **[2]**

(iii) 20% of the children took less than T seconds to complete the puzzle. Use the graph to estimate the value of T. **[1]**

Formulae:	For the regression line: $y = a + bx$	$a = \frac{\Sigma y \Sigma x^2 - \Sigma x \Sigma xy}{n\Sigma x^2 - (\Sigma x)^2}$ and $b = \frac{n\Sigma xy - \Sigma x \Sigma y}{n\Sigma x^2 - (\Sigma x)^2}$
	Coefficient of correlation	$r = \frac{\Sigma(x-\bar{x})(y-\overline{y})}{\sqrt{\Sigma(x-\bar{x})^2 \Sigma(y-\bar{y})^2}}$
	Spearman's rank correlation coefficient:	$\rho = 1 - \frac{6\Sigma d_i^2}{n(n^2-1)}$