United International **University**
School of Science and Engineering
Department of Computer Science and Technology
Mid- term Examination Trimester: Spring-2022
Course Title: Probability & Statistics
Course Code: Math 2205 Marks: 30 Time: 1 Hour 45 Mins

Q1

(a) The following back -to-back stem and leaf diagram shows the cholesterol count for a group of 45 people who **exercise daily** and for another group of 63 who **do not exercise**. The figures in brackets show the number of people corresponding to each set of leaves. [6]

People who exercise			People who do not exercise	
(9)	9 8 7 6 4 3 2 2 1	3	1 5 7 7	(4)
(12)	9 8 8 8 7 6 6 5 3 3 2 2	4	2 3 4 4 5 8	(6)
(9)	8 7 7 7 6 5 3 3 1	5	1 2 2 2 3 4 4 5 6 7 8 8 9	(13)
(7)	6 6 6 6 4 3 2	6	1 2 3 3 3 4 5 5 5 7 7 8 9 9	(14)
(3)	8 4 1	7	2 4 5 5 6 6 7 8 8	(9)
(4)	9 5 5 2	8	1 3 3 4 6 7 9 9 9	(9)
(1)	4	9	1 4 5 5 8	(5)
(0)		10	3 3 6	(3)

Key: 2 | 8 | 1 represents a cholesterol count of 8.2 in the group who exercise and 8.1 in the group who do not exercise.

$Q_1 = 5.4$, $Q_3 = 8.3$

(i) Give one useful feature of a stem and leaf diagram $Q_2 = 6.5$, $IQR = 2.9$

(ii) Find the median and the **IQR** of the cholesterol count for the group who do not exercise.

You are given that the lower quartile, median and upper quartile of the cholesterol count for the group who exercise are 4.25, 5.3 and 6.6 respectively.

(iii) On a single diagram on graph paper, draw two box and whisker plots to illustrate the data.

(b) During January the numbers of people entering a store during the first hour after opening were as follows [4]

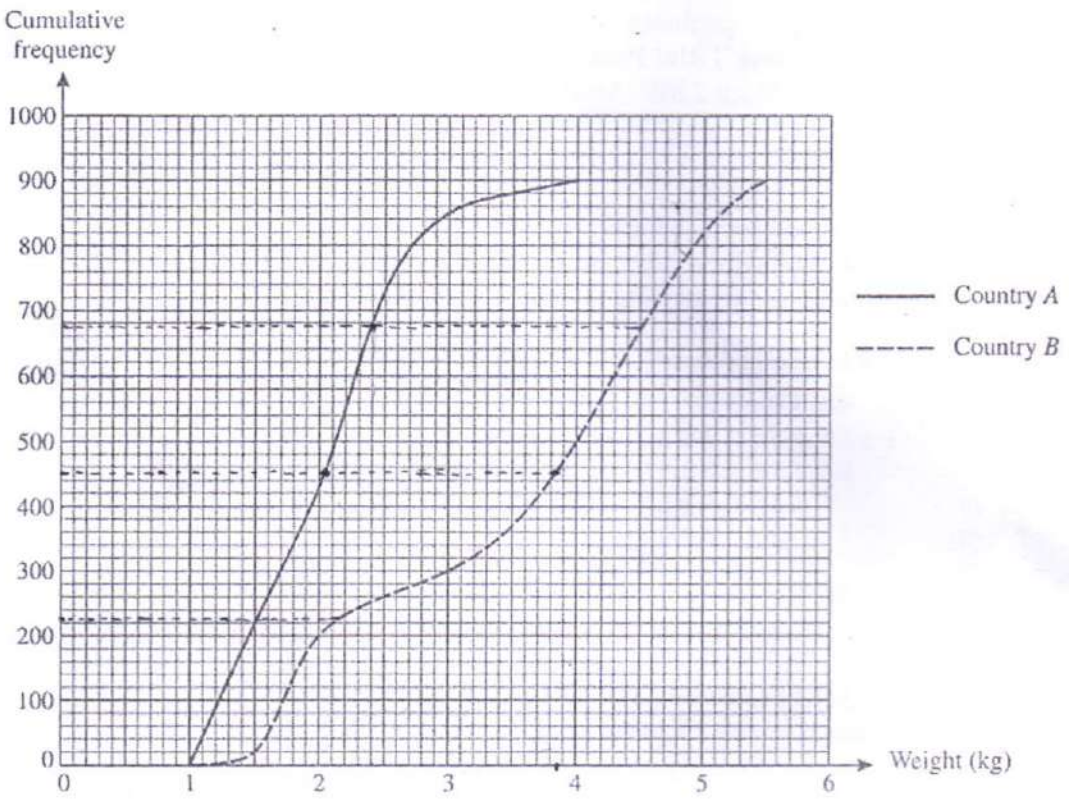
Time after opening, x minutes	Frequency	Cumulative frequency
$0 < x \leqslant 10$	210	210
$10 < x \leqslant 20$	134	344
$20 < x \leqslant 30$	78	422
$30 < x \leqslant 40$	72	a
$40 < x \leqslant 60$	b	540

(i) Find the values of a and b. 494 , 16

(ii) Find the mean entering time 18.2

Q2

(a)



The birth weights of random samples of 900 babies born in country A and 900 babies born in country B are illustrated in the cumulative frequency graphs. Use suitable data from these graphs to compare the central tendency and spread of the birth weights of the two sets of babies. **[4]**

(b) With the help of scatter diagrams, explain the meaning of
- (i) Negative correlation
- (ii) Perfect correlation

(c) In a training scheme for young for young people, the time they took reach a required standard of proficiency, were measured. The average training time in days for each age was recorded and the result are shown

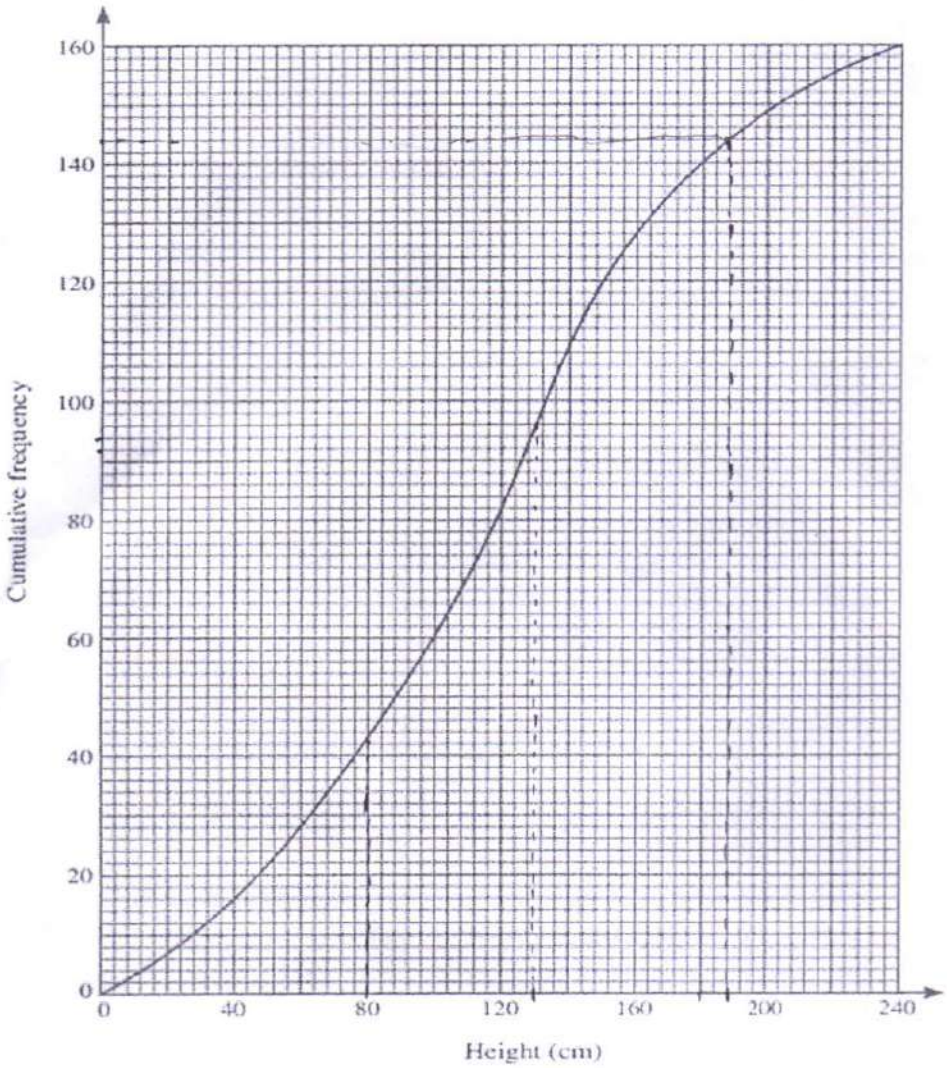
Age of trainees and their average training time

Age x In years	16	17	18	19	20	21	22	23	24	25
Average Training time Y(days)	8	6	7	9	8	11	9	10	12	11

Find the correlation coefficient between average training time and age of trainee and interpret the result. **[6]** $r = 0.83$

Q3

(a) The heights in cm of 160 of certain plants were measured. The results are summarized on the following cumulative frequency curve.



(i) Use the Graph to estimate the number of plants with heights less than 80cm 42

(ii) Use your Graph to estimate the 60th percentile of the distribution ≈ 130cm

(iii) 10% of the plants are considered as extra-large. Find the minimum length for a plant to be extra-large. 188cm [4]

(b)

Over a period of time a publishing house records the sales Y thousand of 10 similar books task-books, and the amount $x hundred, spent on advertising each book. The following table shows the data for 10 books

X	0.75	3.90	1.65	1.60	4.40	3.05	3.55	2.65	0.45	2.00
Y	2.00	5.35	3.00	2.40	5.95	4.50	4.60	3.65	1.30	3.25

(a) Find the equation of the regression line of Y on X., giving the coefficients to 2 decimal places.

(b) Verify your model with any one of the values. [6]

$Y = 0.93 + 1.11X$