United International University

School of Science and Engineering

Department of Computer Science and Engineering

Mid Examination Trimester-Fall – 2022

Course: Math -2205 (Probability & Statistics)

Total marks - 30; Duration – 1 hour 45 minutes

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

1.

(a)

Each member of an athletics club was asked to monitor the distance run in training during a particular week. The table below summarizes the results.

Distance to nearest Km	30-40	40-50	50-60	60-70	70-80	80-90
Number of athletes'	2	4	9	8	9	6

(i) Identify the modal and median Class

(ii) Estimate the standard deviation of this population of athletes

(b)

Ten candidates were ranked as follows by two independent examiners, according to the score they obtained in an interview.

Candidate Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Ranked by Ex. 1	7	9	1	3	8	4	10	5	6	2
Ranked by Ex. 2	9	5	1	4	6	7	8	2	10	3

Calculate the Spearman's rank correlation Coefficient and interpret the result.

[6+4 =10]

2.

(a)

The following table summarizes the performance analysis of three teams in a football tournament. Interpret the result mentioning which team's performance is better and consistent.

	Mean Number Goal	Standard deviation
Team A	3.15	1.37
Team B	2.9	0.29
Team C	1.23	2.05

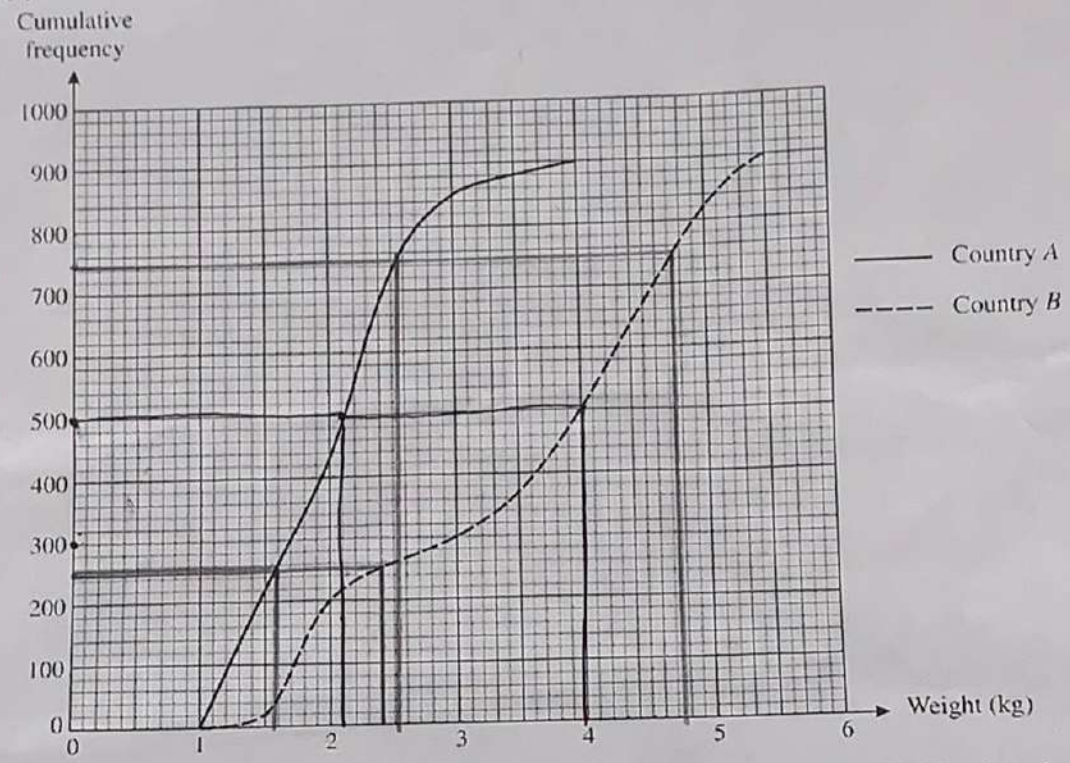
(b)

The annual salaries in thousands of dollars, for 11 employees at each of the two companies A and B are shown below.

Company A	30	32	35	41	41	42	47	49	52	53	64
Company B	26	47	30	52	41	38	35	42	49	31	42

Represent the data by drawing back-to-back Box and Whisker plot on the same axis and then compare their distribution.

(c)



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.

[2+4+4 =10]

3.

The years of experience (x) and the yearly salary ($\$ y$) of the employees of a company are presented in the following table.

Years of experience	x	3	4	4	6	9	10
Salary in thousand $	y	80	94	102	105	115	123

(i) Using the above set of data calculate the value of r (coefficient of correlation) and interpret the result

(ii) Find the regression line in the form $y = a + bx$

(iii) Verify your model found in question (ii) with the tabular value for 6 years' experience.

(iv) Predict the annual salary for a person with 12 years' experience.

[10]

Related Formulae:

For the linear regression $y = a + bx$ $\quad a = \frac{\sum y \sum x^2 - \sum x \sum xy}{[n\sum x^2 - (\sum x)^2]}$ and $b = \frac{n\sum xy - \sum x \sum y}{[n\sum x^2 - (\sum x)^2]}$

Spearman's rank correlation Coefficient: $\rho = 1 - \frac{6\sum d_i^2}{n(n^2-1)}$

$$r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}}$$

Coefficient of Correlation