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Daffodil International University

Department of Software Engineering
Faculty of Science & Information Technology
Final Examination, Spring 2024
Course Code: STA 101, Course Title: Statistics I
Level: 2 Term: 1 Batch: 40

Time: 2 Hours **Marks: 40**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	a)	**Explain** a simple linear regression model with an **example.**	[2]	CO2 Level 2
	b)	**Describe** the main difference(s) between correlation and regression analysis.	[2]	
	c)	**Give** two important laws of probability.	[1]	
2.		Suppose you are a researcher interested in understanding the relationship between the number of hour's students study for an exam and their corresponding exam scores for a particular department. You want to determine if there is a correlation between the times spent studying (in hours) and the exam scores (out of 100). You have collected the following samples.		CO3

Study hour	5	10	8	15	3	6	12	15	10
Test scores	70	70.5	65.5	58	50.25	45	82	68	72

	a)	**Classify** the dependent and independent variable when the test score is being predicted and give explanation of your classifications.	[2]	Level 3
	b)	**Relate** the correlation between study hours and test scores by obtaining two methods with appropriate interpretation. (Scatter diagram and Pearson correlation coefficient.)	[4]	Level 3
	c)	**Build** a regression model between study hours and test scores. Also interpret regression coefficient(s) from the estimated regression model.	[4]	Level 3
	d)	Imagine a researcher who wants to check if the average test score of 10 Software Engineering (SWE) students is notably different from the overall mean test score of 75. They have test scores of 10 students: 76, 83, 84, 71, 88, 90, 75, 85, 70, and 89. **Develop** an appropriate **hypothesis** based on parameter and test of your hypothesis at 5% level of significance to support the claim. [TAB=2.26]	[5]	Level 3
3.	a)	Consider the experiment of rolling a pair of 6-sided dice. We assume that the dice are fair. **Layout** the sample space of the experiment. Also, **Infer** the probabilities of (i) the sum of the rolls is odd, (ii) the sum of rolls is 10.	[5]	CO4 Level 4
	b)	A new computer virus can enter the system through e-mail or through the internet. There is a 30% chance of receiving the virus through e-mail. There is a 40% chance of receiving it through the internet. Also, the virus enters the system simultaneously through e-mail and internet with probability 0.15. **Identify** the probability that the virus does not enter the system at all?	[5]	Level 4
	c)	If 3% of electronic units manufactured by a company are defective. **Predict** the probability that in a sample of 100 units, less than 2 bulbs are defective?	[5]	Level 4
	d)	Suppose, $X \sim Binom(n, p)$; where $n = 5$ and $p = 0.6$. **Identify** (i). $P(X = 2)$, (ii). $P(X \leq 2)$ And (iii). $P(X \geq 3)$.	[5]	Level 4

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