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Daffodil International University
Department of Software Engineering
Faculty of Science & Information Technology
Midterm Examination, Fall 2023
Course Code: DS411; Course Title: Statistical Data Analysis
Sections & Teachers: A (MHS)

Time: 1:30 Hours **Marks: 25**

Answer ALL Questions

Imtiaz Kamal

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

1.	**Explain** the following concepts with appropriate examples: a. *Random Experiment* b. *Random Variable* c. *Probability Distribution* d. *Discrete Random Variable* e. *Continuous Random Variable*	**[Marks-5]**	**CO-1** ***Level-2***
2.	You are to participate in an exam for which you had no chance to study, and for that reason cannot do anything but guess for each question (all questions being of the multiple choice type, so the chance of guessing the correct answer for each question is 1/d, d being the number of options per question; so in case of a 4-choice question, your chance is 0.25). Your instructor offers you the opportunity to choose amongst the following exam formats: 1. 6 questions of the 4-choice type; you pass when 5 or more answers are correct. 2. 5 questions of the 5-choice type; you pass when 4 or more answers are correct. 3. 4 questions of the 10-choice type; you pass when 3 or more answers are correct. **Calculate** the probabilities of your chance of passing in each of the above formats.	**[Marks-5]**	**CO-2** ***Level-3***
3.	a) You read about a survey in a newspaper and find that 70% of the 250 people sampled prefer Candidate A. You are surprised by this survey because you thought that more like 50% of the population preferred this candidate. Based on this sample, is 50% a possible population proportion? **Calculate** the 95% confidence interval to be sure. b) You were interested in how long the average psychology major at your college studies per night, so you asked 10 psychology majors to tell you the amount they study. They told you the following times: 2, 1.5, 3, 2, 3.5, 1, 0.5, 3, 2, 4. 1) **Calculate** the 95% confidence interval on the population mean. 2) **Calculate** the 90% confidence interval on the population mean.	**[Marks-10]**	**CO-3** ***Level-3***
4.	Suppose a random sample of 10,000 individuals from Bangladesh is taken, revealing that 1,111 individuals exhibit left-handedness. A	**[Marks-5]**	**CO-4** ***Level-5***

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	significance test was conducted to see whether the sample data provides evidence that the proportion of left-handed individuals in the Bangladeshi population exceeds 10%. The obtained test statistic was 3.70, with a corresponding p-value of 0.0001. Moreover, a 99% confidence interval is calculated to estimate the proportion of individuals in Bangladesh that exhibit left-handedness, yielding a range of (0.103, 0.119). Please consider the following assertions: 1) The data suggests that a proportion above 10% of the Bangladeshi population is characterized as left-handed. 2) The data presented in the sample indicates that the prevalence of left-handed individuals in Bangladesh exceeds the expected proportion of 10%. **Evaluate** both statements and decide which of these two leads to the more appropriate conclusion? **Justify** your answer based on the significance test and confidence interval results.		

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