



Daffodil International University  
Faculty of Science & Information Technology  
Department of Information Technology & Management  
Mid-Term Examination, Spring 2024  
Course Code: STA 101; Course Title: Statistics I  
Sections & Teachers: All

Time: 2.0 Hrs

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 the difference between marginal probability, joint probability, and conditional probability using a real-life example, such as student performance and attendance.   | [Marks-3]                | CO-1<br>Level-2 |     |   |     |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |
|                  | b)                                                                                                                                                                                                                                                                                                                                             | Compare the mean, median, and mode of the following data<br>10, 18, 12, 11, 12, 14, 13.                                                                                      | [Marks-2]                |                 |     |   |     |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |
| 2.               | a)                                                                                                                                                                                                                                                                                                                                             | Discuss simple and multiple regression with example. Also write the model of the simple and multiple regression.                                                             | [Marks-4]                | CO-2<br>Level-2 |     |   |     |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |
|                  | b)                                                                                                                                                                                                                                                                                                                                             | Illustrate how measures of dispersion—such as range, variance, and standard deviation—help in understanding the spread of the following data set: 10, 18, 12, 11, 12, 14, 13 | [Marks-4]                |                 |     |   |     |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |
| 3.               | A fitness coach gathered data on the number of weekly workout sessions and the weight loss in kg after one month for 7 clients:                                                                                                                                                                                                                |                                                                                                                                                                              |                          | CO-3<br>Level-3 |     |   |     |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |
|                  | <table border="1"><tr><td>SL</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr><tr><td>Workout Sessions</td><td>1</td><td>2</td><td>2</td><td>3</td><td>4</td><td>5</td><td>5</td></tr><tr><td>Weight Loss (kg)</td><td>0.5</td><td>1</td><td>1.3</td><td>1.8</td><td>1.7</td><td>2</td><td>2.2</td></tr></table> |                                                                                                                                                                              | SL                       |                 | 1   | 2 | 3   | 4 | 5 | 6 | 7 | Workout Sessions | 1 | 2 | 2 | 3 | 4 | 5 | 5 | Weight Loss (kg) | 0.5 | 1 | 1.3 | 1.8 | 1.7 | 2 |
| SL               | 1                                                                                                                                                                                                                                                                                                                                              | 2                                                                                                                                                                            | 3                        | 4               | 5   | 6 | 7   |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |
| Workout Sessions | 1                                                                                                                                                                                                                                                                                                                                              | 2                                                                                                                                                                            | 2                        | 3               | 4   | 5 | 5   |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |
| Weight Loss (kg) | 0.5                                                                                                                                                                                                                                                                                                                                            | 1                                                                                                                                                                            | 1.3                      | 1.8             | 1.7 | 2 | 2.2 |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |
|                  | (a)                                                                                                                                                                                                                                                                                                                                            | Classify dependent and independent variable of the data with explanation.                                                                                                    | [Marks- 3]               | a               |     |   |     |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |
|                  | (b)                                                                                                                                                                                                                                                                                                                                            | Demonstrate scatter diagram with explanation                                                                                                                                 | [Marks- 2]               | b               |     |   |     |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |
|                  | (c)                                                                                                                                                                                                                                                                                                                                            | Calculate the correlation coefficient between workout sessions and weight loss.                                                                                              | [Marks- 3]               | c               |     |   |     |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |
|                  | (d)                                                                                                                                                                                                                                                                                                                                            | Determine the regression equation and interpret the coefficient                                                                                                              | [Marks- 4]               | d               |     |   |     |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |
|                  | (e)                                                                                                                                                                                                                                                                                                                                            | Predict and interpret the expected weight loss for a client who works out 6 times a week using the regression model                                                          | [Mark - 2]               | e               |     |   |     |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |
|                  | (f)                                                                                                                                                                                                                                                                                                                                            | Compute residual for the client who works out 4 times a week.                                                                                                                | [Mark - 2]               | f               |     |   |     |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |
|                  | (g)                                                                                                                                                                                                                                                                                                                                            | Demonstrate the regression equation.                                                                                                                                         | [Mark - 2]               | g               |     |   |     |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |
| 4.               | In a survey of 135 people, <u>78 like Coffee</u> , <u>55 like Tea</u> , and <u>30 do not like both Coffee and Tea</u> .<br>(a) Draw a venn diagram to present the data<br>(b) Find the probability that a person selected at random likes only Coffee.                                                                                         |                                                                                                                                                                              | [Mark - 2]<br>[Mark - 2] | CO-4<br>Level-3 |     |   |     |   |   |   |   |                  |   |   |   |   |   |   |   |                  |     |   |     |     |     |   |

Page 1 of 2

13.5  
23  
6  
4  
23

3.5

|                                                                                                                     |            |
|---------------------------------------------------------------------------------------------------------------------|------------|
| (c) What is the probability that a person selected at random likes either Coffee or Tea, but not both?              | [Mark - 2] |
| (d) What is the probability that a person selected at random likes Coffee, given that the person does not like Tea. | [Mark - 2] |

## Formula

$$\text{Mean}(\mu) = \frac{\sum_{i=1}^n x_i}{n}$$

$$\sigma^2 = \frac{1}{N} \sum_{i=1}^N (x_i - \mu)^2$$

$$s^2 = \frac{1}{n-1} \sum_{i=1}^n (x_i - \bar{x})^2$$

$$r = \frac{\sum xy - \frac{(\sum x)(\sum y)}{n}}{\sqrt{\left[ \sum x^2 - \frac{(\sum x)^2}{n} \right] \left[ \sum y^2 - \frac{(\sum y)^2}{n} \right]}}$$

$$\alpha = \bar{y} - \beta \bar{x}$$

$$\beta_{yx} = \frac{\sum (xy) - \frac{(\sum x)(\sum y)}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}}$$

$$P(A) = \frac{\text{Favourable case}}{\text{Total case}}$$

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$