Military Institute of Science & Technology (MIST)
Department of Computer Science and Engineering
Session: Level 2 (Fall 2020)
Course Code: CSE 214, Course Title: Numerical Methods Sessional

Assignment on Numerical Integration and Differentiation

Please read the instructions carefully

Instructions:

- ❏ This is an individual Assignment
- ❏ Solve the problems using Matlab. Submit one file containing solutions for both **problem A** and **problem B**.
- ❏ Your code must run without any errors.
- ❏ Along with the Matlab code, you have to submit a report which should contain the following
    1. Actual solution of the Integration. You will use this result to compare with the results found by using approximation.
    2. Comparison of the results found from **problem A** and **problem B** and your comments on the findings.
- ❏ Report can be Handwritten or Computer Composed (preferred).
- ❏ Rename your report and your matlab code with your student ID.
- ❏ Your efforts are more important than the results. So please avoid plagiarism. If found guilty, severe penalty awaits.
- ❏ Late submission will not be considered at all.
- ❏ Marks Distribution

Serial	Description	Marks
1	Actual Solution of Integration	3
2	Solution using Trapezoidal Method	4
3	Solution using Simpson Method	4
4	Graph Plotting	2
5	Comments on Findings	7
6	Bonus	2
	Total	**20**

Military Institute of Science & Technology (MIST)
Department of Computer Science and Engineering
Session: Level 2 (Fall 2020)
Course Code: CSE 214, Course Title: Numerical Methods Sessional

Assignment on Numerical Integration and Differentiation

1. $\int_0^2 \sqrt{x}dx$
2. $\int_0^3 e^{-x^2} dx$
3. $\int_{-1}^{3/2} 1/(1 + x^2)\, dx$
4. $\int_{-\pi/2}^{\pi/2} cos\, 2x\, dx$
5. $\int_{-3}^{5} (4x - 3)^3\, dx$

Your problem number = (Student_ID % 5) + 1

A. Compute the trapezoidal approximation for **[1 | 2 | 3 | 4 | 5]** using regular partition with at least 4 different values of *n*. Compare the estimate with the actual result for each case. Plot the results in a graph. Show how the error percentage changes with the change of n.
B. Compute the Simpson approximation for **[1 | 2 | 3 | 4 | 5]** using regular partition with at least 4 different values of *n*. Compare the estimate with the actual result for each case. Plot the results in a graph. Show how the error percentage changes with the change of n.

Compare the results of **A** and **B** and comment on your findings.

Bonus: Plot a linear graph showing the change in errors. Use more than 4 values of *n*.

For example,
Figure 1 shows the Trapezoidal Approximation of a curve where n varies from 2 to 5. The Blue line denotes the actual curve. If you take 4 different values of *n*, you must subplot 5 graphs (the actual curve and 4 others for 4 values of n). Then for each case, you have to find out the error percentage.
For bonus marks, plot the error percentages in a linear graph.

Assignment on Numerical Integration and Differentiation

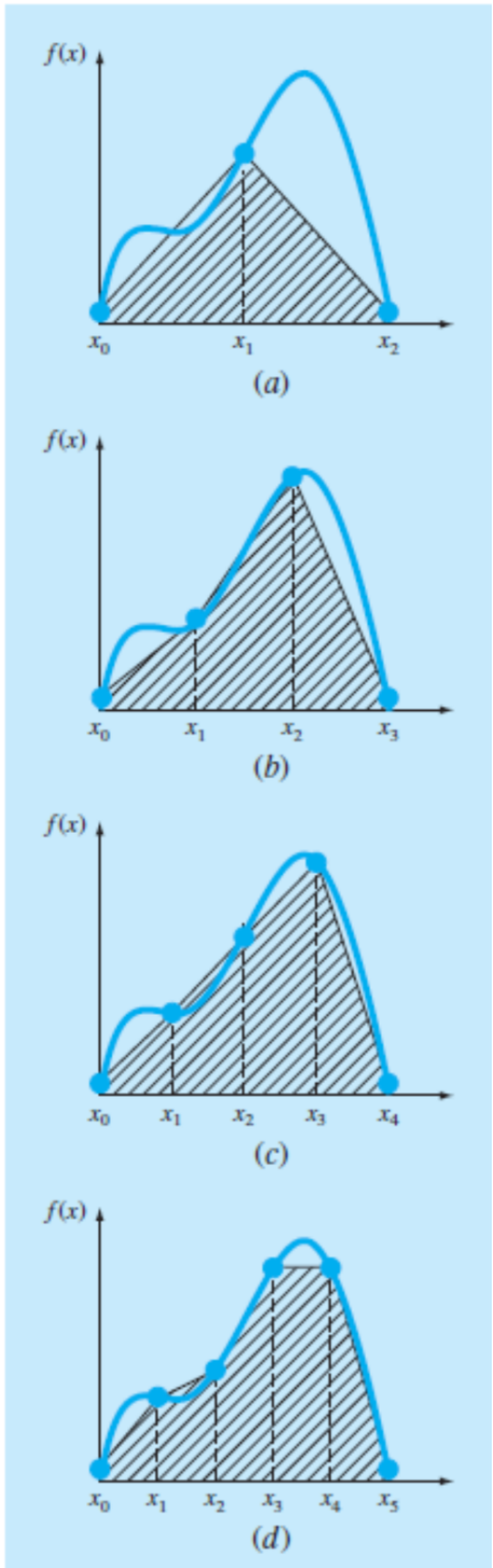

Figure 1: Trapezoidal Approximation where n = 2, 3, 4, 5