Semester Project – Section B

This problem statement is only for section B students

Problem Statement

You have started a business of making cardboard boxes for disabled pets during your free time. For this purpose, you use any available cardboard to create the box. Customers have the option to bring raw material (cardboard piece) of their own. To make the box accessible to the pets, it needs to have an open top as well as one open side. The first customer has brought a cardboard piece that is 31 inches wide and 55 inches long. You plan to cut two squares of equal size from two corners on the long side of the cardboard and fold up the three rectangular flaps to form the box. The goal is to maximize the volume of the box. Draw a picture of this scenario on paper and label all the relevant sides. Because every customer will bring a different size cardboard, you have decided to use MATLAB to write a program which will provide you the optimal dimensions to maximize the volume. The program will take dimensions of the cardboard as input and return the volume and dimensions of the box after applying optimization technique learnt in class.

Program requirements

1. The program must come with a detailed instructions manual explaining each line of the program and steps required to successfully run the program.
2. On (every) first run, the program must display name of your software house, and your programming team along with student ids.
3. At this stage, a message should be displayed to press any key to continue.
4. The program should ask the user to input width and length of the cardboard piece.
5. The program should apply the optimization technique learnt in class to find the solution. Relevant MATLAB commands should be used to find derivative and solution of the problem. Using the final equations obtained through by-hand solution will not result in any marks.
6. The dimensions of the box and the maximum volume should be displayed as output.
7. At this stage, the program must ask the user if they wish to run another query or terminate the program. Based on user input, program must act accordingly.

Report Requirements

Students are required to submit a complete report of their project in their own words, including:

1.	Objective of the problem.	(5 marks)
2.	By hand solution of the problem.	(15 marks)
3.	Flowchart or code flow diagram.	(5 marks)
4.	Explanation of major MATLAB commands used.	(5 marks)
5.	A detailed example to run the program and detailed results section as specified in the program requirements. (can include screenshots)	(10 marks)
6.	3D plot of the box. (can include screenshots)	(5 marks)
7.	Conclusions and analysis of the problem, its solution, methodology, and comparison of results with by hand solution.	(5 marks)
8.	Contribution section; mention contribution of each group member.	(5 marks)
9.	Difficulties faced during this project and how you overcame them.	(5 marks)
10.	Complete and well commented (MATLAB) program as 'Annexure A' of the report.	(15 marks)

Each report element should be documented under a separate heading. Report must not exceed 12 A4 size pages including table of contents as well as a single title page with project title, student names, ids, section, and name of the course. 3 marks will be deducted for every extra page. Each page should be numbered.

Project Submission Guidelines

- This is a group project and carries 75 marks.
- A group can have maximum of 3 students.
- If a student wishes to work individually, they can submit individual project.
- Plagiarized work (from internet or fellow students) will result in zero marks.
- Deadline for complete project submission on **google classroom** (one MS Word file, one pdf of the same Word file and one program file) is Friday 25 Dec 2020 latest by 11:59pm.
- Do not submit your project via email, it will not be considered.
- Name of your project files must be as per following format: **Section_ID1_ID2_ID3**. (e.g., B_123456_654321_987654)
- Deadline for complete project submission in hard copy is first day after university reopens.
- 15 Marks will be deducted in case of missing hard copy of the project.
- Late submissions will not be considered.