ME 101 Assignment 4 Winter 2022

Deliverables

Questions 1 to 3 of this assignment will be completed in pairs.

In this assignment you will:

- Use `if` statements
- Input from file and output to file
- Use loops

There are three deliverables for this assignment:

- Question 1
- Question 2
- Question 3

Crowdmark submission with partnership

Prior to submitting your project work to Crowdmark, you need to form a group according to the instructions (shown below) when you are at the Assignment 3 submission area in Crowdmark.

Click the **Add group members** button at Crowdmark and choose your group for this assignment or wait for someone else to add you to their group. **You will not be able to change your group members after the assignment has been submitted.**

Each group member you add will receive an email notification and shared access to this page. Any group member may submit the assignment or edit group members.

Question 1 – Classifying Paving Stones (Again)

In assignment 3 you wrote a program to classify paving stones as,

Square Rectangle Parallelogram

Modify your assignment 3 program so it:

- Prompts for the length of 2 adjacent sides (in cm) and the contained angle (0° < angle < 180°), and uses a loop to ensure the data for the sides and angle is valid. You may assume that the user enters numbers.

Read the feedback on assignment 3, and if appropriate, improve the code to avoid repeating comparisons. Marks will be lost for unnecessary repetitions. Address any other feedback noted by the grader.

Sample output, that does not cover all test cases, is:

```
Enter two adjacent sides and a contained angle 8.1 6.5 180
Enter two adjacent sides and a contained angle 0 3.2 45.7
Enter two adjacent sides and a contained angle 2.5 2.5 90
The paving stone is a square
```

What to Submit in Crowdmark

- Your code, and include adequate test cases to demonstrate the new feature of the program is working properly in `/*Block comments*/` at the end

Question 2 – Processing Temperature Data from a File

The file `Dec_temp_2021.txt` contains the list of daily high and low temperatures for the 31 days in December 2021. The file is formatted so each line contains the data for one day, with the daily high temperature followed by the low temperature.

Sample lines:

```
3      0
8      0
1      -1
3      -1
1      -3
```

Write a program that

- Reads the data from the file to determine:
  - The lowest daily high temperature in the month of December
  - The highest daily low temperature in the month of December
- Outputs both to the console in a clear and legible format

Example output:

```
The lowest daily high temperature in December was -4
The highest daily low temperature in December was 3
```

What to submit in Crowdmark

1. Ensure that your code is properly formatted such that it is easy to read and line-breaks are appropriately managed
2. Ensure that your name and any acknowledgments of help are included at the top of the relevant files as //comments or /* comments */
3. Make sure you save an electronic copy of the cpp files. You are allowed to re-use the code in future ME 101 assignments this term provided it is acknowledged

Question 3 – Regatta

The University of Waterloo Regatta (sail-boat race) may be allowed to run this year. The organizers want help determining the shortest time and longest time in minutes to sail the race. The boats in the race have staggered (i.e. different) start times over the course of the day. All times are in a 24 hour format (1430 is 2:30pm). You can assume the race course is designed so that no boat will take more than 23 hours, 59 minutes to complete the course.

The file `boat_regatta.txt` contains the start time and end time for each of the boats. Sample lines from the file are:

```
   0  1601
 108  1257
  :     :
1315   420
  :     :
```

Write a program that

- Opens the file `boat_regatta.txt`, and checks that the file has opened correctly
- Opens an output file to store the results
- Reads the start and end time for each boat, and determines the time in minutes that it took for the boat to complete the race, and outputs this data to the file
- Outputs to the file the shortest and longest times

What to submit in Crowdmark

- Your code, and include the output that was generated from the given file to demonstrate that all features of the program are working properly in /*Block comments*/ at the end