MAKERERE UNIVERSITY
COLLEGE OF ENGINEERING, DESIGN, ART AND TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING
MEC2203: COMPUTER PROGRAMMING Project Assignment 1

Project Instructions:

1. This project contains four problems and is to be done in groups of 5 students and carries 50 points.
2. You are required to submit a well written report including all the steps used in handling the problems, source code and executable files of the project.
3. This project is due on **Friday 22nd of February 2019 at midday.**
4. Submit the files as C++ source code and the executables through MUELE.
5. The documents should be zipped and the file named as *project1_group_names.zip*.
6. One member should submit on behalf of each group.

Problem 1

Many treadmills output the speed of the treadmill in miles per hour (mph) on the console, but most runners think of speed in terms of pace. A common pace is the number of minutes and seconds per mile instead of mph. Write a program that starts with a quantity in mph and converts the quantity into minutes and seconds per mile. As an example, the proper output for an input of 6.5 mph should be 9 minutes and 13.8 seconds per mile. If you need to convert a double to an int, which will discard any value after the decimal point, then you may use: **(5 points)**

```
intValue = static_cast<int>(dblVal);
```

Problem 2

To convert temperatures written in Fahrenheit to Celsius (Centigrade), it is required that you subtract 32, multiply by 5 and then divide by 9. On the other hand, to convert Celsius to Absolute Value (Kelvin), you add 273.15. Write a program that displays a temperature conversion chart on the screen as follows:

(5 points)

```
Fahrenheit        Celsius       Absolute Value

   0               -17.78              255.37
   20              -6.67                266.48
   40              4.44                277.59
   ...             ......              ......
   ...             ……..               ......
   300             48.89               422.04
```

Problem 3: Distance conversion (20 Marks)

You are required to write a complete C++ program that will first ask you to enter a distance with units. This program will request for the distance you want to convert it to followed by displaying the desired unit conversion.

The units your program should be able to convert from/to:
Inches: "in" or "inches"
feet: "ft" or "feet"
meters: "m" or "meters"
centimeters: "cm" or "centimeters"

Your program should be able to accept the input either as the shortened version right after the number (see example 1) or as the full name after a space (see example 2). This applies to both the units before and after the conversion. The final answer should be the converted amount without units.

Use the following conversions:
12 inches = 1 foot
1 foot = 0.3048 meters
1 meter = 100 centimeters

Example 1 (user input is underlined):

```
Enter distance with units:
200m
What do you want to convert this to?
inches

7874.02
```

Example 2 (user input is underlined):

```
Enter distance with units:
1.3 feet
What do you want to convert this to?
cm

39.624
```

Problem 4: It's getting hot in here (20 marks)

You are required to write a C++ program that can figure out how long it will take to heat/cool a room (using any simplified equation). Enter both the current temperature and the temperature being ventilated into the room. After 5 minutes, the two temperatures will "average". (For example, if the current room temperature is 32 degrees and you ventilate in 20 degrees, after 5 minutes the temperature will be (32+20)/2 = 26 degrees). The program should output the first time the room is within one degree of the ventilated temperature (at one of the 5 minute marks).

```
Example 1 (user input is underlined):
Initial room temperature:
200
Ventilated air temperature:
42
Time until temperature equalized:
40

Example 2 (user input is underlined):
Initial room temperature:
0
Ventilated air temperature:
42
Time until temperature equalized:
30
```