PF Fall 2021 - Assignment 1

Submission Instructions:

1) Make a separate .cpp file of each question i.e. Q1.cpp, Q2.cpp …
2) Add all the files to a single folder. Compress and name the folder as l21-roll #-A1.rar e.g. l21-9876-A1.rar
3) You can email me (aamina.batool@lhr.nu.edu.pk) or your TA Salman (l181127@lhr.nu.edu.pk), if you have any query.
4) Plagiarism tool will be used to check if you have cheated off of internet or any other source. If someone's assignment is plagiarized, that student will be given F straight away so beware.
5) You have to upload your assignments in google classroom. Don't forget to turn in after uploading your assignment.
6) You cannot use loops or arrays, loops, breaks, continue and goto statements.
7) The deadline for this assignment is **October 9, 2021, 11:59 pm**. No late submission will be accepted.

Question 1.

Solve Q # 2 from exercise of Chapter 2 of DS Malik C++ Programming Program Design Including Data Structures 8th Edition.

Question 2.

Solve Q # 8 from exercise of Chapter 2 of DS Malik C++ Programming Program Design Including Data Structures 8th Edition.

Question 3.

Solve Q # 11 from exercise of Chapter 2 of DS Malik C++ Programming Program Design Including Data Structures 8th Edition.

Question 4.

Solve Q # 5 from exercise of Chapter 4 of DS Malik C++ Programming Program Design Including Data Structures 8th Edition.

Question 5.

[Currency Conversion]
International travelers often need to convert some amount of money from currency into another. For example, a Pakistani traveler to Malaysia got his amount converted into US Dollars and Ringgit Malaysia. In Malaysia he needed more Ringgits so he got some of his US Dollars converted into Ringgits. The calculations for conversions are really simple but travelers are not typically good at math.
In this problem you are required to write a simple program that will take two inputs
  i)   the amount to be converted
  ii)   the rate of conversion,
  iii)   and then display the amount
that the traveler must receive after conversion. The formula for conversion is

Target Amount = Amount multiplied by the Exchange Rate

Write a program in the space provided below where the marks will be awarded for:

☐ Correct indentation.
☐ Using number of correct type of variables.
☐ Correct inputs and input validation (amount and rate > 0)
☐ Correct calculations
☐ Correctly showing the answers and messages.

Question 6.

[BODY MASS INDEX CALCULATOR]
The BMI (Body Mass Index) is calculated using height (measured in meters) and weight (measured in Kg) of a person. A person with BMI of 25.0 or more is considered overweight, while the healthy/normal range is 18.5 to 24.9 and a person with BMI less than 18.5 is considered underweight. The formula for computing BMI is

$$BMI = weight/ height^2$$

Where the weight is in kilograms and height is in meters.
Write a program that can be used to compute the BMI of a person. Your program must input weight in Kilograms and Height in centimeters. Your program must convert the height into meters (1 Meter = 100 centimeters) and then use it to compute the BMI of the person using formula described above. The program must display a message indicating if the person is underweight, overweight or has normal weight. Marks will be awarded for:

☐ Correct indentation.
☐ Using number of and correct type of variables.
☐ Correct conversions and calculations
☐ Correctly showing the answers and messages.

Question 7.

The first 11 prime integers are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, and 31. A positive integer between 1 and 1000 (inclusive), other than the first 11 prime integers, is prime if it is not divisible by 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, and 31.

Write a C++ program that prompts the user to enter a positive integer between 1 and 1000 (inclusive) and then outputs whether the number is prime. If the number is not prime, then output all the numbers, from the list of the first 11 prime integers, which divide the number.

Question 8.

The roots of the quadratic equation $ax^2+bx+c = 0$, $a \neq 0$ are given by the following formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

In this formula, the term $b^2 - 4ac$ is called the discriminant. If $b^2 - 4ac = 0$, then the equation has a single (repeated) root. If $b^2 - 4ac > 0$, the equation has two real roots. If $b^2 - 4ac < 0$ the equation has two complex roots.

Write a C++ program that prompts the user to input the value of a (the coefficient of x^2), b (the coefficient of x), and c (the constant term) and outputs the type of roots of the equation. Furthermore, if $b^2 - 4ac>=0$, the program should output the roots of the quadratic equation.