DEPARTMENT OF COMPUTER ENGINEERING
CMPE110: Fundamentals of Computing and Programming
EXPERIMENT 3
Introduction to C++ Programming: Selective structure

Objectives:
1) Understand how to edit, compile and execute C++ computer codes.
2) Understand C++ programming: selective structure.

Note: Before writing a computer code, you should do the following steps: 1) **understand** and **analyze** the problem, 2) develop an **algorithm** or **flowchart** and 3) convert the **algorithm** or the **flowchart** into a C++ **code**.

1) Consider the following code that finds the maximum of two integer numbers:

```cpp
#include<iostream>
#include<cmath>
using namespace std;
int main(){
int Num1;
int Num2;
cin>> Num1 >> Num2;
if(Num1 > Num2)
    cout<< Num1<< endl;
else
    cout<< Num2<< endl;
system("pause");
return 0;}
```

   a) Edit, compile and execute this code. Use the following input values for Num1 and Num2: **4, 8**.
   b) Modify the given code to read the three numbers and print the maximum one.

A sample run of the program must be as follows:

```
***Program to claculate the maximum of three integer numbers ***

Enter the three number: 4, 8, -3
The maximum number is 8.
```

2) To calculate the total points of a student in CMPE110 course according to his midterm, lab, and final grades, the following weights are used:
     Midterm 40%,
     Final 50%,
     Lab 10%.
Write a C++ code that reads the student's midterm, final and lab grades and then computes and prints on the computer monitor his

total point. If the total point is greater than or equal 60, then display
You passed
Congratulations
Otherwise, display
You failed
Sorry
A sample run of the program must be as follows:

```
*** Program to calculate the total point in CMPE110 course ***
Enter your grades in final, midterm, and quiz? 70 85 80
Your total point is 77.0
You passed
Congratulations
Enter your grades in final, midterm, and quiz? 40 20 30
Your total point is 29.0
You faild
Sorry
```

3) Write a C++ code that reads two integer numbers and one operator (+, -, *,/), and then perform the required operation. **Note:** If the user enters a wrong operator, then your code should display "wrong operator" as an output. **You may write the code using either switch or if/else selective structure.**

A sample run of the program must be as follows:

```
*** Calculator Problem ***

Enter two numbers: 4 3

Enter one operator: +

4 + 3 = 7
```

```
*** Calculator Problem ***

Enter two numbers: 4 3

Enter one operator: >

Wrong operaor
```

4) Given a triangle with side lengths **a, b** and **c,** its area can be computed using the Heron's formula:

Area=sqrt(s*(s-a)*(s-b)*(s-c)).

where **s** is the half of the perimeter length:

s=(a+b+c)/2.

Write a program to read in the coefficients **a, b** and **c,** and compute the area of the triangle. However, not any three numbers can make a

triangle. There are two conditions. First, all side lengths must be positive:

a>0, b>0, and c>0.

and second the sum of any two side lengths must be greater than the third side length:

a+b>c, a+c>b, and b+c> a.

In the program, these two conditions must be checked before computing the triangle area.

A sample run of the code can be

Enter a, b and c: 3.0 5.0 7.0

Triangle area = 6.49519062

Enter a, b and c: 3.0 4.0 8.0

ERROR: this is not a triangle!

Enter a, b and c: -1.0 3.0 5.0

ERROR: this is not a triangle!

5) Consider the following quadratic equation:
   $A*X^2 + B*X + C$
Then, the roots of this equation can be obtained as
   X1 = (-B + SQRT(Disc))/(2*A)
   X2 = (-B - SQRT(Disc))/(2*A)
where the discriminator **(Disc)** is given by
   Disc = B^2 − 4*A*C
   A. Write a C program that will read the value of the inputs A, B, and C, and then check for the following conditions and do the corresponding tasks:
      ➢ If **Disc > 0**, then find the roots **X1** and **X2** and then display the result as,
         The roots are different: X1=…….. X2=………
      ➢ If **Disc = 0**, then find the roots **X1 and X2** and ten display the results as
         The roots are equal: X1 = X2=……….
      ➢ If **Disc <0**, then display the following message: **The roots are imaginary**.

   B. Can you write the same code by using switch statement rather than if/else.