ECE 175 Computer Programming for Engineering Applications

Fall 2021

Lab Assignment #2

Wednesday, September 15, 2021

Relevant Programming Concepts:

- **Conditional branching structures (if-then-else statements)**
- **Loop structures**

Problem 1 (15 Points): Triangles

Three lengths (A, B, C) can be formed into a triangle if three conditions are met

- $A + B > C$
- $B + C > A$
- $C + A > B$

Also, an isosceles triangle is a triangle that has two sides of equal length. However, if all three sides are equal then the triangle is an equilateral triangle.

Write a C program that asks the user to enter three lengths. Check to see if the three lengths can be formed into an isosceles triangle, equilateral triangle, triangle, or no triangle at all. Report the results to the user.

Sample Code Execution: Bold text indicates information entered by the user

```
Enter in three sides of a triangle A,B,C: 11.4, 5.6, 11.4
Sides A = 11.40, B =  5.60, C = 11.40 will form an isosceles triangle

Enter in three sides of a triangle A,B,C: 10.9, 3.2, 5.6
Sides A = 10.90, B =  3.20, C =  5.60 cannot be formed into a triangle

Enter in three sides of a triangle A,B,C: 9.8, 9.8, 9.8
Sides A =  9.80, B =  9.80, C =  9.80 will form an equilateral triangle

Enter in three sides of a triangle A,B,C: 10.9, 5.7, 5.6
Sides A = 10.90, B =  5.70, C =  5.60 can be formed into a triangle

Enter in three sides of a triangle A,B,C: 5, 2, 2
Sides A =  5.00, B =  2.00, C =  2.00 cannot be formed into a triangle
```

Problem 2 (10 Points): For-Loop

Develop a C program that

- Asks the user to enter a value of N
- Finds and display the sum of all positive numbers from 10-250 (inclusive) that are divisible by N
- Finds and displays the total number of values from 10-250 (inclusive) that are divisible by N.

Sample Code Execution: Bold text indicates information entered by the user

```
Enter a value for N: 10
There are 25 values between 10-250 that are divisible by 10
Sum of numbers between 10-250 that are divisible by 10 is 3250

Enter a value for N: 23
There are 10 values between 10-250 that are divisible by 23
Sum of numbers between 10-250 that are divisible by 23 is 1265
```

Other test cases:N = 300 (answer: 0 value and sum = 0), N = 1 (answer: 241 values and sum = 31330), N = 7 (answer: 34 values and sum = 4403)

Problem 3 (5 Points): While-Loop

Develop a C program that

- Asks the user to enter the number of digits P
- Uses a *while-loop* to find the smallest value of N for which the sum of 2 through N has more than P digits; i.e. $2 + 4 + 6 + \cdots + N >= 10^{P-1}$.
- Displays the results

Sample Code Execution: Bold text indicates information entered by the user

```
How many digits? 2
Find Smallest N >= 10
N = 6,  Sum = 12

How many digits? 3
Find Smallest N >= 100
N = 20,  Sum = 110

How many digits? 4
Find Smallest N >= 1000
N = 64,  Sum = 1056
```