
CSCI 1380 Homework 1

Due Date: Sept. 28

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Problem (100 points):

The area of a triangle with sides of length a , b , and c , can be computed by the formula

$$Area = \sqrt{s(s-a)(s-b)(s-c)},$$

where $s = (a + b + c)/2$. Write a program in C++ which will ask for the lengths of the three sides of a triangle, and output the area of the triangle.

The outline of the program looks like this:

```
/******  
* Program Name:    hwOneMain.cpp  
* Author:         ??????  
* UTPA SID:       ??????  
* Due Date:       02/02/2009  
* Course:         CSCI 1380.01  
* HW Assignment:  One  
*  
* Description:    Here is a brief description of the program.  
*                [Add your description here.]  
*****/
```

```
#include <iostream>  
using namespace std;
```

```
int main()  
{  
    // declaration of variables  
    // prompt for and read the lengths of the sides  
    // compute the semiperimeter and area  
    // display the input values and the resulting area  
  
    return 0;  
}
```

For example, if you entered 7, 14, and 16 as the lengths, the program should compute 48.9228 as the area. The output of the program should look similar to the following:

The area of the triangle with sides 7, 14, and 16 is 48.9228

Test your program with the following data:

3, 4, 5	(answer is 6.0)
5, 12, 13	(answer is 30.0)
7, 14, 16	(answer above)

and four more inputs of your choice.

You may only use the commands we have covered. That is, do not use looping for this program.

NOTE: Have your program send the output to both the screen and an output file. To have all 7 outputs appear in the same output file, use the following statements:

Sending the output to both the screen and a file

Currently, the output of the program is going to the print screen window. Now, we will have the output written to a disk file in addition to the print screen window. **NOTE:** This should only be done **after** your program is working correctly!

NOTE: In future programs, you will be required to redirect your output to a disk file, so get used to these steps!

Steps to redirect output to disk file:

1) In the section where you have the *#include* commands (at the top of the program) add the following line:

```
#include <fstream>           // For file I/O
```

2) At the end of the variable declaration section of **main** add this statement:

```
ofstream outFile;           // File with the results
```

As the first line of the program, after all the declarations, add

```
outFile.open("hw1Output.txt"); // Open the output file
```

You may choose any name as long as it is not the name of any file currently on the disk. The " " marks are required around the filename. This file will be placed in the same folder as your C++ source program.

Copy each output statement (but NOT the prompts), replacing *cout* with *outFile*. For instance,
`cout << "The area of the triangle is " << area << endl;`

becomes

```
cout << "The area of the triangle is " << area << endl;  
outFile << "The area of the triangle is " << area << endl;
```

Note that you should have two output statements – one to the screen and one to the file. Change only those output statements that are actual output (i.e. **do not change your prompting messages**).

After all output operations are done, close the file:

```
outFile.close();
```

Save your program.

NOTE: Each time you run the program, you will erase your previous output file. So, if you run the program several times, your output file will only store the output from the last time you ran the program. To resolve this issue, modify the open statement as follows:

```
outFile.open("hw2Output.txt", ios::app); // Open the output file
```

This will cause the output to be added to the file every time you run the program.

Extra Bonus Part A (10 points). This part is optional. If you can get it done, you will receive 10 extra points.

Modify the program of Assignment 1 that you have completed so that it can repeatedly calculate the areas of triangles for the user. That is, it does the following:

- (1) It asks the user for the three sides of a triangle and calculates the area and display the result.
- (2) It then asks the user whether he/she wants to calculate the area of another triangle.
- (3) If yes, then it repeats (1) and (2). If no, it stops.

Extra Bonus Part B (20 points). This part is optional. If you can get it done, you will receive 20 extra points.

Once you have completed Extra Bonus Part A, you can add another component to determine the triangle is a right triangle or not. A triangle with three sides, a, b, and c is right, if $c^2 = a^2 + b^2$. Here, we assume that c is the longest side. If the triangle is right, then display the pattern of a rectangle two shorter sides of the triangle. Say, for a triangle with side, 3, 4 and 5, the two shorter sides are 3 and 4. The pattern of the rectangle can be something like

```
* * * *      @ @ @
* * * *      or  @ @ @ or other ones you may like.
* * * *      @ @ @
              @ @ @
```

Submission guidelines

- Submit printed copies of all the programs and their execution results for given test data to TA.
- Submit electronic copies of all the programs that you wrote for this assignment via [Blackboard](#).
- Both paper and electronic copies must be submitted before or in class by the due date posted on the course webpage.
- Note that this assignment must be completed by each student individually (no teamwork please!).