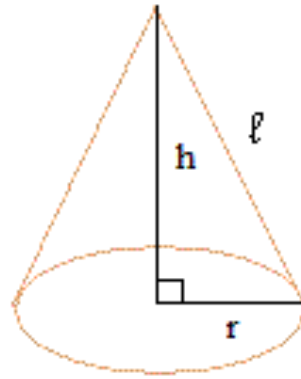


# CSCE 1030 – Homework 1

Due: 11:59 PM on Wednesday, February 11, 2015 CST

## Problem Statement:

The purpose of this programming project is to write a small C++ program to perform volume and surface area calculations for a right circular cone as shown.



Your program's output should initially display the department and course number, your name, your EUID, and your e-mail address.

In this program, you will calculate the volume and surface area of a right circular cone using the formulas  $V = \frac{1}{3}\pi r^2 h$  and  $SA = \pi r^2 + \pi r l$ , respectively, where  $r$  = radius,  $h$  = height, and  $l$  = length. To perform these calculations, you will prompt the user for the radius of the right circular cone, and the height of the right circular cone. While you may have as many variables as needed, you may not prompt the user for the length of the cone (as you must calculate the length given using the given information).

You may either declare your own constant using  $\text{PI} = 3.141592653589793$  or use a pre-defined constant from a C++ library. Either way, your calculations for the volume and surface area should be accurate, rounded to 8 decimal places.

You may assume that all input will be of the appropriate data type, so you do not need to do error checking. You do not have to worry about units for the volume and surface area.

Your program's output should initially display the department and course number, your name, your EUID, and your e-mail address. Following, you will prompt for their name and display an introductory or welcome message. Then prompt for the radius and the height of the right circular cone. After performing the calculations, you will finally, display the results.

## Design:

On a piece of paper (or word processor), write down the algorithm, or sequence of steps, you will use to solve the problem. You may think of this as a "recipe" for someone else to follow. Continue to refine your "recipe" until it is clear and deterministically solves the problem. Be sure to include the steps for prompting for input, performing calculations, and displaying output.

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You should use the formulas given above (and a calculator) to work out what the answer should be for one or two sets of inputs.

Type these steps and the calculations into a document (Word, txt, PDF, etc.). Note that this should be done before you start coding as completing it afterwards does not help you in learning the design process.

## **Implementation:**

Now that you have a working design, your next step is to translate these steps into C++ code. Use the algorithm development techniques discussed in class to implement your solution to the problem above. Add your C++ code a little at a time, and compile and test as you go.

Remember to add your comments to your code to explain your program. Do this before/during programming instead of waiting until the end. At a minimum, you should comment the header (e.g., name, class, date, brief description of the program, etc.), all variables (i.e., what they are used for), and specific “blocks” of code. For example, use comments to describe the inputs, the formulas used, and any other important steps in your code.

Your program will be graded based largely upon whether it works correctly on a CSE Department machine, so you should make sure your program compiles and runs on a CSE machine.

Your program will also be graded based upon your programming style. At the very least, your program should include:

- A consistent indentation style as recommended in the textbook and in class;
- Meaningful variable names;
- A block header comment section that includes: your name, e-mail address, and a brief description of the program.

## **Testing:**

Test your program to check that it operates as desired with a variety of inputs. Compare the answers your code gives with the ones you get from hand-calculations. Although your program is not required to check for incorrect inputs, observe the effect of such inputs. Try typing “hello world” when your program asks for a number. What is the result?

Sample input and output appears below (with input shown in **bold**):

```
+-----+
|      Computer Science and Engineering      |
|      CSCE 1030 – Computer Science I       |
| Student Name      EUID      euid@my.unt.edu |
+-----+
```

Please enter your name: **Mark**  
Hello, Mark! Welcome to CSCE 1030!

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Please enter the radius of the cone: **9.4**

Please enter the height of the cone: **3.78**

The volume of the cone is: 349.76481986

The surface area of the cone is: 576.78577340

## **Documentation:**

When you have completed your C++ program, write a short report (2 – 3 paragraphs) describing what the objectives were, what you did to solve the problem, and the status of the program. Does it work properly for all test cases? Are there any known problems?

Save this report in a separate file to be submitted electronically. You should also include any specific instructions required to compile or execute your code.

## **Homework Submission:**

In this class, we will be using electronic homework submission to make sure that all students hand their programming projects (and labs) on time. You will submit your program source file to the class website through the “**Homework 1**” drop box by the due date and time.

**Note that this project must be done individually.** The program will be checked using a code plagiarism tool against other solutions, so please ensure that all work submitted is your own.

Note that the dates on your electronic submission will be used to verify that you met the due date above. All homework up to 24 hours late will receive a 50% grade penalty. Later submissions will receive zero credit, so hand in your best effort on the due date.

## **Summary:**

- You will design an algorithm (or steps used) to solve the problem.
- You will implement your program on the CSE machines using C++. You will make sure to use good style, good variable names, indentation, etc. You will compile, run, and test your code.
- You will write a brief report describing what your code does and how well it works.
- You will submit electronically your C++ code, your design, and your brief report.