

CS11 Programming Assignment # 1 due Thursday 23 Sept. 1999

The Garden Hose

It's easy to measure the length and width of a hose, and a water meter can display how much water is pumping through the hose. You will write a C++ program that will manipulate these figures to give the user more useful information about what is going on inside the hose.

The purpose of this assignment is to get you familiar with the basics steps of writing a complete C++ program. This program features simple I/O and performs some straightforward numerical calculations.

Input... Ask the user for these quantities:

1. the width of the hose, in inches
2. the length of the hose, in feet
3. the water pressure (how fast the water is gushing), in gallons per second

Output... Tell the user:

1. the weight of the empty hose, in pounds
2. the weight of the hose when it is filled with water, in pounds
3. how fast the water is moving through the hose, in feet per second
4. how long it will take to fill an empty hose, in seconds

Assumptions and hints:

1. The empty hose will weigh exactly 1 ounce per linear foot.
2. The water inside the hose is in the shape of a cylinder. The volume of this water is $(\pi) * (\text{radius of hose})^2 * (\text{length of hose})$.
3. Declare π as a **float** value equal to 3.141593. All variables in this program will be of type **float**.
4. One cubic foot of water weighs 62½ pounds and one gallon of water weighs 8 pounds.
5. You should format all floating-point output to exactly one decimal place.
6. You will use more than the seven variables needed for I/O. Do not derive magical formulas that will get you all of the results in one assignment statement. Rather, use extra variables to make intermediate computations.
7. Your program should exemplify good style. The output from your program should appear as if it were prepared for a professional document, such as company letterhead of your own fictitious company. For instance, all decimal points from the output figures should be vertically aligned. Also, please make your source file as readable as you can. Your documentation should explain in English how you determine the output quantities, so that the reader can walk through your algorithm.

Example I/O:

```
*****  
* Welcome to the Furman Garden Supply Company *  
* We sell garden hoses in a variety of sizes *  
*           tailored to your needs.           *  
*****
```

How wide is the hose (in inches)? **0.625**

How long is the hose (in feet)? **175**

What is the water pressure
(in gallons per second)? **0.5**

Weight of empty hose 10.9 pounds

Weight of hose filled with water 34.2 pounds

Speed of water inside the hose 30.0 feet/second

Time to fill the hose 5.8 seconds

Thank you for using the Garden Hose program.
Good bye.