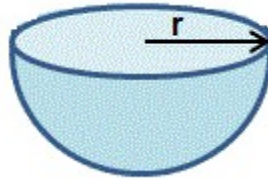


Problem:

Suppose your math professor asks you to create a calculator to determine the volume of a hemisphere based on its radius. To make it more charming you decide that your program will ask the user's name before asking for the needed data to calculate the volume. You must use the formula shown below where **r** is the radius of the hemisphere.



$$Volume = \frac{2}{3} \pi r^3$$

The radius must be entered as a whole number, but the volume must be calculated as a double-precision real number with just one decimal digit.

To know who discovered the volume of a hemisphere go to:

<http://www.famousscientists.org/archimedes-makes-his-greatest-discovery/>

Requirements:

Implement in C++ the algorithm solution (Pseudo-code) shown below:

- 01) Include your libraries here. Explain the libraries being used with comments.
- 02) Declare named constant variable(s) called "**PI**" that hold(s) the value: **3.1415**.
- 03) Declare variable(s) named "**name**" that hold(s) **text**.
- 04) Declare variable(s) named "**radius**" that hold(s) **integer number(s)**.
- 05) Declare variable(s) named "**volume**" that hold(s) **double-precision real number(s)**.
- 06) Declare input file stream variable(s) called "**inFileA**".
- 07) Associate the input file stream variable(s) with the name of the file(s) to be used appropriately.
- 08) Check if the input file was properly associated and opened. ⁱ
 - If the file was not opened, then
 - 01) Display on the screen: ⁱⁱ
Error opening the file...

Press any key to continue...
 - 02) Close the program with integer -1
- 09) Get the name from the input file and store it in the corresponding variable. ⁱⁱⁱ
- 10) Get the radius from the file and store in the corresponding variable.
- 11) Calculate the volume of the hemisphere using the formula provided in the handout with same format and assign the result to the corresponding variable.
Formula: volume = (2 / 3) * PI * radius * radius * radius ^{iv}
- 12) Round the volume to the nearest tenths (One decimal digit) and reassign to the appropriate variable. ^v
- 13) Format output in fixed decimal notation displaying two digit(s) after the decimal point.
- 14) Display on the screen the message: ^{vi}
OK, [username],

The volume of a hemisphere of radius [radius] is [volume].

Press any key to continue...

- 15) Close the input stream variable.
- 16) Terminate your program with integer 0.

Note: You must use the tools learned in the class, slides, and book from chapter 2 and below; otherwise, you will receive no credit for the lab!

The program **MUST** compile without errors or warnings. Try to work on it before we meet for the lab so you can advance as much as possible during the lab period.

I am posting the executable of my solutions for your reference. Please run them and ensure that your programs works like mine. Try different values for the height and radius and compare the results returned by your solution with mine.

Please include at the top of your program the following comments. Don't forget to include them because they will count toward the grade of this lab.

```
//*****  
// Course Number and Section:  
// Course Semester:  
// Your Name:  
// --Only if he helped you with the assignment--  
// Teammate Name:  
// -----  
// Program Description:  
//  
//*****
```

Submission:

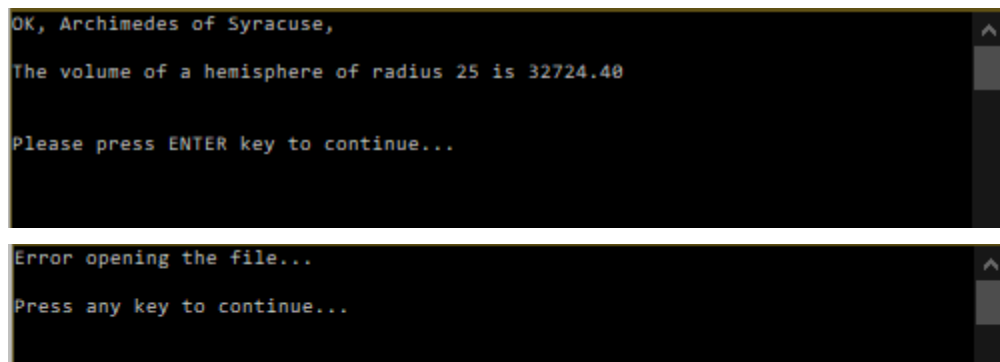
Please name your file **lab2TXX** (where **XX is the team number of your group**). If you work with a **teammate**, then make sure to also in the lab heading.

DO NOT include blank spaces in the name of the file please.

For example: lab01T00.cpp

When done, submit your solution through Blackboard using the “Assignments” tool. Do Not email it.

Sample Screenshot:



```
OK, Archimedes of Syracuse,  
  
The volume of a hemisphere of radius 25 is 32724.40  
  
Please press ENTER key to continue...  
  
Error opening the file...  
  
Press any key to continue...
```

Grading Criteria:

	Levels of Achievement			
Criteria	Exceptional	Proficient	Satisfactory	Unsatisfactory
Heading	100.00%	50.00%	25.00%	0.00%
Weight 10.00%	Included program heading and information is fully completed.	Included program heading, but is missing information.	Included program heading, but did not fill information.	Did not include program heading.
Documentation	100.00%	50.00%	25.00%	0.00%
Weight 15.00%	Program is fully commented, comments are placed above the statements and comments are your own words.	More than half comments added to program, comments are placed above the statements, and/or comments are your own words.	Less than half comments added to program, comments not placed above statements and/or comments are not your own words.	No comments added to program.
Organization	100.00%	50.00%	25.00%	0.00%
Weight 20.00%	White space is applied appropriately and program follows a structured organization. Ex: Follows algorithm and/or some pattern.	White space is mostly added and follows mostly structured organization. Ex: Follows algorithm and/or some pattern.	White space is minimally added and follows minimally structured organization. Ex: Follows algorithm and/or pattern.	No white space is added and follows no structured organization. Ex: Follows algorithm and/or pattern.
Requirements	100.00%	50.00%	25.00%	0.00%
Weight 35.00%	Program requirements were fully met. Look at program handout requirements.	More than half of the program requirements were met. Look at program handout requirements.	Less than half of the program requirements were met. Look at program handout requirements.	Program requirements were not met. Look at program handout requirements.
Accuracy	100.00%	50.00%	25.00%	0.00%
Weight 20.00%	Program output is accurate and is formatted appropriately. Ex: Spacing, new lines, etc.	Program output is accurate and/or mostly formatted appropriately. Ex: Spacing, new lines, etc.	Program output is not accurate and/or mostly formatted appropriately. Ex: Spacing, new lines, etc.	Program output is not accurate and is not formatted appropriately. Ex: Spacing, new lines, etc.

- i Look at Chapter 03 for file manipulation.
- ii Pay attention to the new lines when displaying the message. Look at screenshot and/or sample executable program.
- iii You need to get the full name and store the full name.
- iv Careful with mixed datatypes and used `static_cast` operator where needed and appropriately.
- v Use the method learned from Chapter 02 for method/algorithm of rounding.
- vi Pay attention to the new lines when displaying the message. Look at screenshot and/or sample executable program.