Unit 1: Lab Activity

8/22/2021

Late **10/10** Points

Attempt 2

Review Feedback
8/24/2021

Attempt 2 Score:
10/10

View Feedback

Anonymous Grading: **no**

Unlimited Attempts Allowed

Details

Introduction

The purpose of this assignment is to practice the creation of simple C/C++ programs that follow the input-process-output paradigm.

Requirements for the program include:

1. Name the C/C++ file with the following format: **LastNameFirstNameUnit1cpp.** For example the Instructor may create a file with the following name: TonsmannGuillermoUnit1.cpp.
2. Select appropriate identifiers and data types for all variables. Declare all of them correctly.
3. The input variables are top radius of the spherical segment (**a**), the bottom radius of the spherical segment (**b**), and the height of the spherical segment (**h**). All input values for these variables must be read from the user using **scanf**. These values must be printed after received, with appropriate labels to identify them. This will confirm that the values were properly read.
4. Evaluate the requested formulas and store their results in output variables.
5. Print the values for output variables after evaluation, with appropriate labels.
6. Include appropriate comments. In particular include a header for the main function and description of all variables.
7. The program should compile and run.

Deliverables

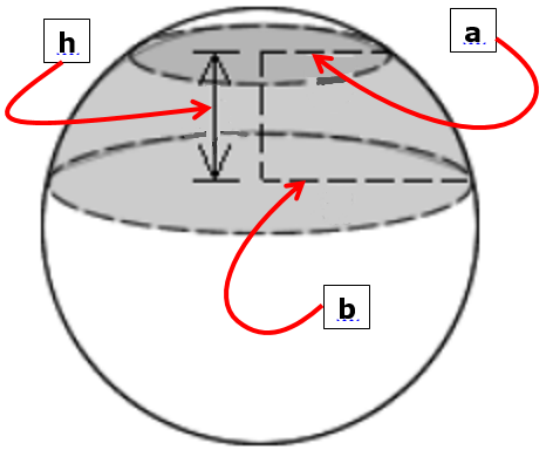
Submit **only** the C/C++ program file when completed. Do not submit anything else. This file is the .cpp file you created with the right name.

Due Date

- by **11:59 p.m., Sunday, CT**

Directions

Write a C/C++ program to calculate the following formulas that describe the dimensions of a **spherical segment** (shown):



1. $Volume = \frac{1}{6}\pi h\left(3a^2 + 3b^2 + h^2\right)$
2. $Top\ Surface\ Area = \pi a^2$
3. $Bottom\ Surface\ Area = \pi b^2$
4. $Sphere\ Radius = R = \sqrt{\frac{\left((b-a)^2+h^2\right)\left((a+b)^2+h^2\right)}{4h^2}}$
5. $Lateral\ Surface\ Area = 2\pi Rh$

Some formulas require the value of π. You may use the value of 3.14159265359 for this constant. Other formulas include a power of two of a variable, for example h^2. To evaluate this, all you must do is to multiply the variable by itself (***h*h***). On the other hand, to evaluate the square root of a variable, you may use the **`sqrt`** function. This function requires you to include the **`math.h`** C library at the beginning of the program, like this:

```
#include <math.h>
```

To calculate the square root of variable ***h*** you should write; **`sqrt(h)`**

Do not use Arrays or any other advanced concept that was not reviewed in the class yet to solve this

assignment. Assignments that use these concepts will only be granted 1 point for presentation.

Example

The program should reproduce the following input-output session:

```
What is the size of the top radius of the spherical segment?
10
What is the size of the bottom radius of the spherical segment?
20
What is the size of the height of the spherical segment?
10
The data your entered is:
The top radius of the spherical segment is 10.00.
The bottom radius of the spherical segment is 20.00.
The height of the spherical segment is 10.00.
With this data you have the following results:
The volume of the spherical segment is 8377.58.
The top surface area of the spherical segment is 314.16.
The bottom surface area of the spherical segment is 1256.64.
The sphere radius of the spherical segment is 22.36.
The lateral surface area of the spherical segment is 1404.96.
```

View Rubric

Select Grader

Luke Donoho

Unit 1 Lab Activity Rubric

Criteria	Ratings		Pts
Criteria Submission of a C/C++ file (.cpp).	**0.5 pts** **Meets Expectations** Student receives half a point (0.5) if s/he submits a file containing a C/C++ program (.cpp).	**0 pts** **Does Not Meet Expectations** Student receives zero (0) points if s/he does not submit a file containing a C/C++ program (.cpp).	0.5 / 0.5 pts
Submission of a of a C/C++ file with the requested name	**0.5 pts** **Meets Expectations** Student receives half a point (0.5) if the submitted C/C++ file has the requested name.	**0 pts** **Does Not Meet Expectations** Student receives zero (0) points under this criterion if the submitted C/C++ file does not have the requested name.	0.5 / 0.5 pts

Unit 1 Lab Activity Rubric

Criteria	Ratings			Pts
Submission of a working C/C++ program.	**1 pts** **Meets Expectations** Student receives one (1) point if s/he submits a C/C++ program that can be compiled and produces a running program.	**0 pts** **Does Not Meet Expectations** Student receives zero (0) points if s/he submits a C/C++ program that does not compile or run.		1 / 1 pts
Appropriate documentation and indentation	**1 pts** **Meets Expectations** Student receives up to one (1) point if the submitted C/C++ program is properly commented and indented.	**0 pts** **Does Not Meet Expectations** Student receives zero (0) points if the submitted C/C++ program is not properly commented or indented.		1 / 1 pts
Correct declaration and initialization of variables	**2 pts** **Exceeds Expectations** Student receives an additional (1) point (2) if the submitted C/C++ program has all its variables properly initialized by an assignment or scanf command.	**1 pts** **Meets Expectations** Student receives up to one (1) point if the submitted C/C++ program has all its variables properly declared at the beginning of the block of code where they are used and they have meaningful names.	**0 pts** **Does Not Meet Expectations** Student receives zero (o) points if the submitted C/C++ program has variables that were not properly declared or initialized.	2 / 2 pts
Correct reading of input variables	**1 pts** **Meets Expectations** Student receives one (1) point if the submitted C/C++ program reads correctly all its input variables.	**0 pts** **Does Not Meet Expectations** Student receives zero (0) points if the submitted C/C++ program does not read correctly all its input variables.		1 / 1 pts
Correct calculation of formulas	**2 pts** **Exceeds Expectations** Student receives two (2) points if the submitted C/C++	**1 pts** **Meets Expectations** Student receives one (1) point if the submitted C/C++ program calculates	**0 pts** **Does Not Meet Expectations** Student receives zero (0) points if the submitted C/C++	2 / 2 pts

Unit 1 Lab Activity Rubric

Criteria	Ratings			Pts
	program calculates correctly all its formulas.	correctly some of its formulas.	program does not calculate correctly its formulas.	
Correct writing of output variables	**2 pts** **Exceeds Expectations** Student receives two (2) points if the submitted C/C++ program writes correctly all its output variables with appropriate labels.	**1 pts** **Meets Expectations** Student receives one (1) point if the submitted C/C++ program writes correctly some of its output variables with appropriate labels.	**0 pts** **Does Not Meet Expectations** Student receives zero (0) points if the submitted C/C++ program does not write correctly its output variables.	2 / 2 pts
				Total Points: 10


```
/*********************************************************************
Bert Darnell
08/24/2021
CS202

This program calculates a spherical segment of a sphere.
It also outputs the radius of different dementions of the segment.

*********************************************************************

#include <math.h>
#include <iostream>

#define pi 3.14159265359    //defines constant for PI

int main() {

    float volume, top_surface_area, bottom_surface_area, sphere_radi
lateral_surface_area;   //declared variables for calculations block
    float a, b, h;  //declared variables for prompted user input

    printf("What is the size of the top radius of the spherical segm
//prompted user input block
    scanf_s("%f", &a);
    printf("What is the size of the bottom radius of the spherical s
    scanf_s("%f", &b);
    printf("What is the size of the height of the spherical segment?
    scanf_s("%f", &h);


    volume = (3*a*a+3*b*b+h*h)*pi*h/6;  //calculations block
    top_surface_area = pi*(a*a);
    bottom_surface_area = pi*(b*b);
    sphere_radius = sqrt(((b-a) * (b-a) + h*h) * ((a+b) * (a+b) + h*
    lateral_surface_area = 2 * pi * sphere_radius * h;

    printf("\nThe data you entered is:");   //output block
    printf("\nThe top radius of the spherical segment is %.2f", a);
    printf("\nThe bottom radius of the spherical segment is %.2f", b
    printf("\nThe height of the spherical segment is %.2f", h);
```

Previous
(https://canvas.park.edu/courses/62124/modules/items/4394322)

Next
(https://canvas.park.edu/courses/62124/modules/items/4394328)

You are unable to submit to this assignment as your enrollment in this course has been concluded.