

CSE108 – Computer Programming Lab.

Lab 2

Basic IO Operations and Expressions

Due at 10am.

Hand in: A student with number 20180000001 should hand in a zip file named 20180000001.zip for this lab.

Part 1. Write a C program that calculates the surface area and volume of a user-defined geometric shape. The program, from the user

1. Request an edge length for the cube and calculate the surface area and volume
2. For rectangular prism, ask sides length, width, and height. Calculate the surface area and volume
3. Request sphere radius value and calculate surface area and volume
4. Request the cone radius value and height. Print it out by calculating the surface area and volume.

*You will not make a choice while doing the homework. You will ask for information for each geometric shape and calculate the area and surface of all of them. You can find the formulas below. You can use these formulas. The example output is given below. (Pi=3.14)

Example Output:

```
Enter the edge length for cube: 5
Surface Area = 150.00, Volume = 125.00
Enter side length for rectangular prism: 10
Enter side width: 6
Enter side height: 3
Surface Area = 216.00, Volume = 180.00
Enter the radius for sphere: 6
Surface Area = 452.39, Volume = 904.78
Enter the radius for cone: 8
Enter the height: 3
Surface Area = 415.80, Volume = 201.06
```

Geometrical Shapes	A	V
Cube	$6a^2$	a^3
Rectangular prism	$2 (a.b + b.c + a.c)$	$a.b.c$
Cone	$\pi r (b + r)$	$\frac{1}{3} \pi r^2 h$
Sphere	$4\pi r^2$	$\frac{4}{3} \pi r^3$

Part 2. Write a body mass index (BMI) calculator program. Get height and weight information from the user. The program should calculate the BMI and print it on the screen. Also, have BMI classified according to what is considered normal, obese, obese, or extremely obese.

The formula for BMI is:

$$\text{BMI} = \text{weight}(\text{kg}) / \text{height}(\text{m})^2$$

For example, if someone weighs 70 kilograms and their height is 1.75 meters, their BMI would be:

$$\text{BMI} = 70 / (1.75^2) = 22.9$$

The BMI calculation results in a single number, which can be interpreted according to the following categories:

- BMI less than 18.5: underweight
- BMI between 18.5 and 24.9: average weight
- BMI between 25 and 29.9: overweight
- BMI of 30 or greater: obese

General Rules:

1. You will have two hours to provide a solution to the given problem set.
2. You will be able to hand in your solutions via Teams in the next two hours. The submission will be closed exactly at 10am.
3. There will be an interview session immediately after the submission deadline. Starting at 10am, you will be randomly invited to attend a meeting by a TA to demonstrate your solution and answer any questions asked by the TA.
4. You must be available until 1pm to respond to the demo invitation whenever you receive it. You will have 3 minutes after you are called via Teams. If you do not answer/appear in 3 minutes, you will miss your interview.

5. If you miss your interview or are unable to give satisfactory answers to the questions, you will receive a zero for that lab even if you have submitted your solution.
6. If you have not submitted a solution in time, you will not be invited for the interview and receive zero for that lab.
7. Due to time constraints, some students may not be invited to an interview. In that case, their solutions will be graded offline.
8. Unless you aren't declared for a specific prototype, you may use arbitrary but proper function and variable names that evoke its functionality.
9. The solution must be developed on given version of OS and must be compiled with GCC compiler, any problem which rises due to using another OS or compiler won't be tolerated.
10. Note that if any part of your program is not working as expected, then you can get zero from the related part, even it is working partially.
11. Zip your solution file before uploading it to MS Teams. The zip file must contain the C file with your solution and screenshots of the valid outputs of the program.