

Qn2. Write a **complete C++** program to calculate area and circumference of a circle. Your program should have the following functions in addition to a `main()` function.

1. **menu** – that displays

Do you want to use radius or diameter for the calculation?
Enter 1 for radius
Enter 2 for diameter
Enter -1 to exit

2. **diameter_to_radius** – receives **diameter** (double) as a parameter and returns **radius** (double).
3. **random_value_generator** – generates random values (double) between minimum and maximum.
4. **area** – receives **radius** (double) as a parameter and returns **area** (double).
5. **circumference** - receives **radius** (double) as a parameter and returns **circumference** (double).

You should start the program by prompting the user to select radius or diameter for the calculation (validate the choice).

radius:

You should ask the user to choose a unit, either cm or m (validate the choice), for the calculation. Generate a random double value (use **random_value_generator**) between **5.0** (minimum) and **15.0** (maximum) for the radius. Prompt the user to choose either **area** or **circumference** calculation (prompt by using character A for area and C for circumference – validate choice).

diameter:

You should ask the user to choose a unit, either cm or m (validate the choice), for the calculation. Generate a random double value (use **random_value_generator**) between 15.0 and 30.0 for the diameter. Before calculating **area** or **circumference** convert **diameter** to **radius** (use **diameter_to_radius** function).

You should exit the program only when the user inputs -1.

All results are printed in main, show only **two decimal numbers** in the final result.

Area of a circle is πr^2 and circumference of a circle is $2\pi r$, where r is the radius of the circle.
radius = diameter/2
Assume the value of π is 3.14159.

The formatting of the output should be similar (including the units) to the screen shot shown.

In this task **double** means double precision floating point value.

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Do you want to use radius or diameter for the calculation?
Type 1 for radius
Type 2 for diameter
Enter -1 to exit
9
Invalid choice, please try again.
Enter an option: 1
Is your unit cm or m ?
r
Wrong unit, give either cm or m
9
Wrong unit, give either cm or m
cm
The radius given by random generator is: 6.93701 cm

Do you want to calculate area or circumference?
Enter 'A' for area and 'C' for circumference
S
Wrong choice, re-enter the choice
A
The area of the circle with radius 6.93701 is 151.18 cm2

Do you want to use radius or diameter for the calculation?
Type 1 for radius
Type 2 for diameter
Enter -1 to exit
2
Is your unit cm or m ?
m
The diameter given by random generator is: 23.44 m
The corresponding radius is: 11.72 m

Do you want to calculate area or circumference of the circle?
Enter 'A' for area and 'C' for circumference
c
Wrong choice, re-enter the choice
C
The circumference of the circle with diameter 23.44 is 73.63 m

Do you want to use radius or diameter for the calculation?
Type 1 for radius
Type 2 for diameter
Enter -1 to exit
-1

```

Q3. Write a **complete C++** program to create a table as shown below. User inputs the width of the table, after creating the shape, your program should calculate the sum of the elements in a particular row entered by the user.

Example run:

Width of the shape? (Enter odd number only) 9

Enter row number to get sum 5

Answer:

```

      1
    1 2 3
  1 2 3 4 5
1 2 3 4 5 6 7
1 2 3 4 5 6 7 8 9
  1 2 3 4 5 6 7
    1 2 3 4 5
      1 2 3
        1
```

Sum of row 5 is 45

Qn4. Write a complete **C program** using the instructions given below. This question allows you to demonstrate the programming skills that you have developed from week 1 to week 9.
(14 Marks)

Declare a structure that contains 3 elements.
First element should be a **char array**.
Second element should be an **int** value.
Third element should be a **float** value.

Declare an array of this structure with **size 5**.

Prompt the user to enter the values for this array of structure and write onto a **text file**. The text file should have three columns (and five rows), first column contains first structure element, second column contains second structure element and third column contains third structure element.

Then prompt the user with the following instructions:

(In all these options you are reading the data from your text files)

1: To sort the array (you should call sort **function** – output of the sorting function is written onto a separate text file)

 You should give the user the chance to sort in ascending or descending order

 Then you should give the user the option to sort the array with respect to second element (int element) or third element (float element)?

 Then you should give the user the option to select from different sorting techniques (you should write minimum two sorting algorithm functions, call the functions according to the choice the user enters – call the sorting function only after the user selects the above mentioned options)

2: To search for an int element (Write the output on terminal)

 You should give the user to select the searching technique (linear or binary)
 if binary is selected call a sort function first

3: To insert these array elements into a stack

 After inserting these elements into a stack ask the user if she/he wants to search for a char element or int element in the stack? (need to use only linear search – print the output on terminal)

 Ask the user if she/he wants to print the elements in reverse order from a stack onto a separate text file? (Print the data in normal order followed by reverse order)

4: To insert these **sorted** array elements (sorted for int elements) into a linked list

5: To insert a one more structure (in right position (ascending order) for int value) into the linked list that you created in option 4.

6: Quit

Your complete program should have multiple files (minimum two .c file and a .h file).

Give your file name as heading and then paste your code. Don't forget to show the screen shots of your text files as well.