Application Development with .NET (32998, 31927)

Lab-3 Questions

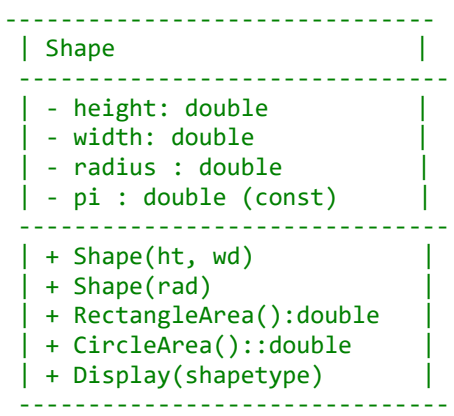
Please download the sample code from Canvas and follow the instructions

Program 1:

Write a program to define a Shape class. The Shape class will be used to create two objects: Circle and Rectangle, and calculate their areas. Shape class should have constructors to initialize circle(with radius) and rectangle(with height and width).

There should be two methods to calculate the area of circle and rectangle. There should be an additional method to display the dimensions of the shapes based on the shape type (circle or rectangle)

The Shape objects should be created in the class containing the main() method. Please use the below class diagram :



The object should be initialized using respective constructors.

Example:

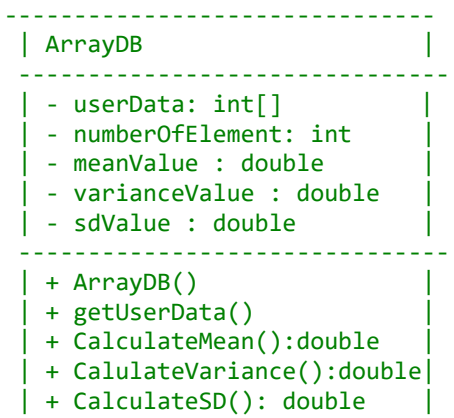
Radius of circle is: 4.0
Height and Width of rectangle is: 5.0 ,4.0
Area of Circle is: 50.26548245743669
Area of Rectangle is: 20.0

Hint:

1. For area of circle use pi =3.142, Area = PI * radius * radius
2. Area of rectangle = height * width
3. Check the main method before creating the shape class

Program 2:

Write a program to Create a ArrayDB class as per below specification



ArrayDB:
1. Contructor to accept the number of Element to inserted into the array from user and store it in numberOfElement
2. initialize the array with the number of element value

getUserData: Gets value from the user to store in the array

CalculateMean: Calculates the mean of the values in the array (Check Tutorial instructions for formula)
CalulateVariance: Calculates the variance of the values in the array(Check Tutorial instructions for formula)
CalculateSD: Calculates the Standard Deviation of the values in the array(Check Tutorial instructions for formula)

In the **Main**() method:
1. Create an Object of the **arrayDB** class
2. Call the **getUserData**() and populate the array
3. Call the methods for mean, variance and Standard Deviation and display the results

Example Test case:

Enter the number of elements in the array: 5
Enter the element 0:1
Enter the element 1:2
Enter the element 2:3
Enter the element 3:4
Enter the element 4:5

The Mean is 3
The Variance is 2.5
The Standard Deviation is 1.58113883008419

Use Math.Sqrt() of square root

Hint:

Given a set of data { x_0, x_1, x_2, …, x_n}, mean, Variance and Standard deviations are:

$$mean = \frac{1}{n}\sum_{i=0}^{n} x_i$$

$$variance = \frac{1}{n-1}\sum_{i=0}^{n}(x_i - mean)^2$$

$$std = \sqrt{variance}$$

Program 3:

Write a program to accept a string from user as Command Line argument and perform the following actions:

1. Split the string into an array of characters
2. Check if a character is a number, operator, an alphabet, etc.
3. Copy them into respective arrays such as NumberArray, OperatorArray, etc.
4. Display the array contents with appropriate message.

Some useful reference:

1. https://docs.microsoft.com/en-us/dotnet/api/system.string?redirectedfrom=MSDN&view=netframework-4.7.2#methods
2. https://docs.microsoft.com/en-us/dotnet/api/system.char?redirectedfrom=MSDN&view=netframework-4.7.2#methods