ಭಾರತೀಯ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ ಸಂಸ್ಥೆ ರಾಯಚೂರು
भारतीय सूचना प्रौद्योगिकी संस्थान रायचूर
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LAB - 2
Introduction to OOP

Submission Guidelines

- Ensure your system is in 'No Aeroplane Mode'.
- No Taskbar should be open.
- Create a new folder named `LAB-2`.
- Inside `LAB-2`, create two question files named in the following format: `[RollNumber]_[LabName]_[QuestionNumber]` (e.g., `12345_MatrixLab_Q1.cpp` and `12345_MatrixLab_Q2.cpp`)

Lab Timing and Submission

- Lab Time: 6:00 PM - 8:00 PM
- Submission Deadline: 8:00 PM - 8:05 PM (Submit on Classroom)
- No Extensions: Late submissions will not be accepted.
- Viva: 8:05 PM - 8:30 PM (Marks will be assigned based on viva performance)

Question 1:- (60 points)

Objective :-

Implement a C++ program that uses **function overloading** to compute the area of three geometric shapes :

1. **Circle**
2. **Rectangle**
3. **Triangle** (using Heron's formula)
4. **Prime Check**

Your task is to define **Four overloaded functions** named `calculateArea` with the following specifications:

Function Specifications

1. Circle

Function Prototype:

```
double calculateArea(double radius);
```

2. Rectangle

Function Prototype:

```
double calculateArea(double length, double width);
```

3. Triangle (Heron's Formula)

Function Prototype:

```
double calculateArea(double a, double b, double c);
```

4. Prime Number Check

Function Prototype:

```
bool calculateArea(int x);
```

Input Type: Integer

Operation:

Checks whether x is a **prime number**. Returns **`true`** if **`x`** is prime, otherwise returns **`false`**.

- Uses **trial division** up to **√x** to determine primality.

Implementation Details

- Implement **three overloaded `calculateArea` functions** based on the number of parameters.

- Use **`cmath`** for mathematical operations like `pow` and `sqrt`.
- Handle **floating-point precision** and format the output to **two decimal places**.

Input & Output

Demonstration in `main()` with sample inputs:

Shape	**Input Parameters**	**Expected Output**
Circle	`radius = 5.0`	`Circle Area: 78.54`
Rectangle	`length = 6.0, width = 4.0`	`Rectangle Area: 24.00`
Triangle	`a = 3.0, b = 4.0, c = 5.0`	`Triangle Area: 6.00`
Prime Check	`x = 7`	`7 is a Prime Number`

Expected Output Format:

```
Circle Area: 78.54

Rectangle Area: 24.00

Triangle Area: 6.00
```

```
7 is a Prime Number(TRUE)
```

Constraints

Do not use **global variables**.
Function names and parameter lists **must match exactly** as described.

Concepts Tested

- **Function Overloading** – Using the same function name with different parameter lists.
  - **Mathematical Computation** – Implementing formulas correctly.
  - **Floating-Point Precision Handling** – Formatting output to **two decimal places**.
  - **Use of `cmath` Library** – Using `sqrt` for Heron's formula.

Question 2:-(40 points)

Let's suppose one of your friends, who is always interested in performing binary arithmetic operations, is showing off in front of you by saying that you're not fast enough. Now you challenge him with the coding skills you have by writing a program in C++ to perform all the operations at once to prove yourself.

(**Note :** Use the concept of **operator overloading** and perform the task. No need for any type of user input).

Input :- Two integers.

Output :- Displaying all the binary operators results.