LAB WORK 1

This lab work aims to fulfil the following CLO:

- CLO3 - Evaluate program to debug using IDE programming tool. (C4, PLO3).
- This lab work contributes to 15% of the total assessment.

QUESTION 1:

The following C++ program is intended to calculate the area of either a circle or a rectangle based on user input as shown below:

```cpp
#include <iostream>
using namespace std;

int main() {
    int choice;
    double radius, length, width, area;

    cout << "Choose a shape to calculate its area:" << endl;
    cout << "1. Circle" << endl;
    cout << "2. Rectangle" << endl;
    cout << "Enter your choice (1 or 2): ";
    cin >> choice;

    if (choice == 1) {
        cout << "Enter the radius of the circle: ";
        cin >> radius;

        area = PI * pow(radius, 2);
        cout << "Area of the circle is: " << area.endl;
    }
    else if (choice == 2) {
        cout << "Enter the length and width of the rectangle: ";
         cout << "Enter the length of the rectangle: ";
        cin << length;
        cout << "Enter the width of the rectangle: ";
        cin << width;

        if ((length > 0) || (width > 0))
            cout << "Invalid input. Length and width cannot be negative." << endl;

        area = length * width; // Calculate area of rectangle
        cout << "Area of the rectangle is: " << area << endl;
    }
    else
        cout << "Invalid choice. Please enter 1 or 2." << endl;
    //end of if

    return 0;
}//end of the main function
```

However, the code contains errors and bugs that need to be identified and corrected. Therefore, your tasks include the following:

- Identify the syntax errors and logic errors present in the given program.
- Describe each identified error and how you solved it.
- Debug the program and provide the corrected version of the program.
- Provide the corrected version of the program with appropriate comments and sample output to ensure correct functionality.

- The program should handle negative values appropriately and provide accurate area calculations for both the circle and rectangle.

Once completed, please upload your PDF file via our Learning Management System (LMS). Additionally, ensure that you save your program to your GitHub account and provide the link in the pdf file for sharing.

Marking Scheme:

Here's a suggested marking scheme for the given debugging task, with a total of 30 marks:

1. **Identification of Syntax Errors (6 marks):**
   Award up to 2-3 marks for each correctly identified syntax error.

2. **Identification of Logic Errors (6 marks):**
   Award up to 2-3 marks for each correctly identified logic error.

3. **Explanation of Identified Errors (6 marks):**
   Award up to 2-3 marks for each well-explained identified error, including its impact on the program and why it occurred.

4. **Debugging, Correctness of Debugged Code (6 marks):**
   Award up to 2-3 marks for the correctness of the final code after debugging.

5. **Appropriate Comments (2 marks):**
   Award up to 2 marks for the presence of appropriate comments explaining the purpose and functionality of the code.

6. **Sample Output (4 marks):**
   Award up to 2 marks for the sample output provided after debugging the code, demonstrating correct functionality.

(Total: 30 marks)

Problem identified :

1. **Syntax Error**
   - ◉ Missing <cmath> library
   - ◉ No declaration of PI
   - ◉ Incorrect stream operator for cin (<<) for length and width

2. **Logic Error**
   - ◉ Incorrect condition for checking -ve and 0 value
   - ◉ missing else statement after ((length > 0) || (width > 0)) resulting to a bug

Problem Solving :

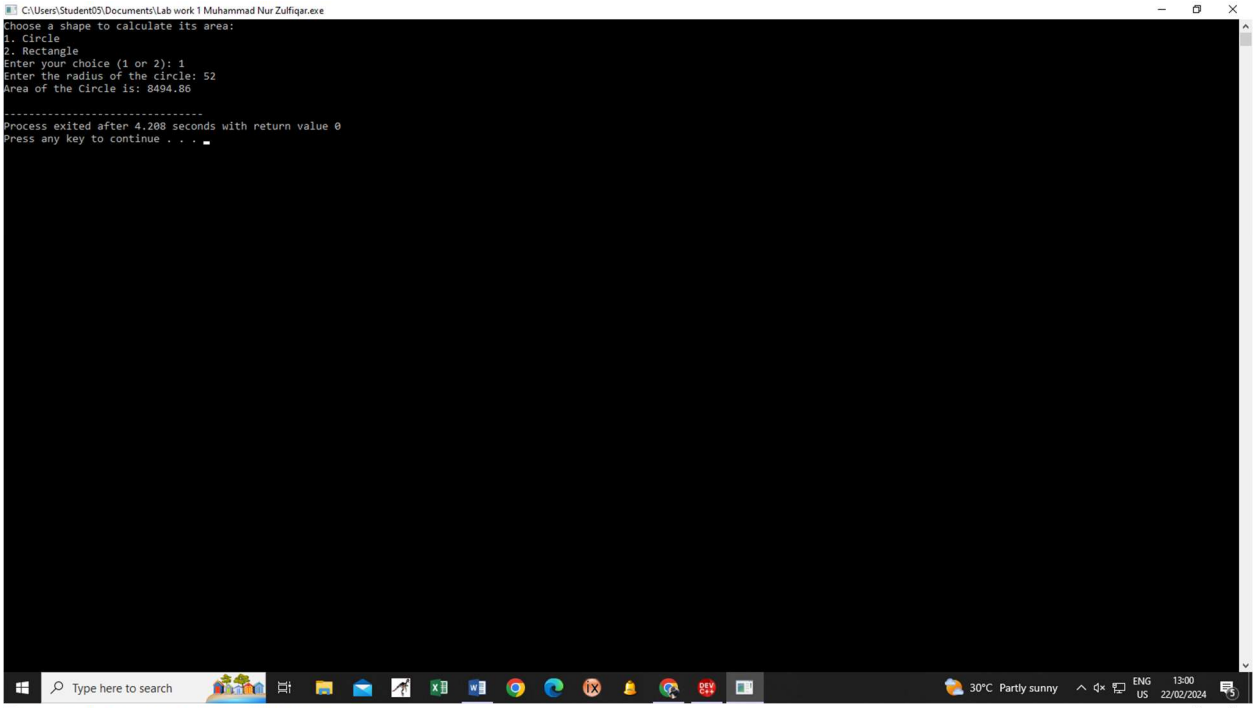
1. **Syntax Error**
   - ◉ Added <cmath> library
   - ◉ PI is declared as constant
   - ◉ Fixed the stream operator for cin to (>>) for length and width
   - ◉ Added Else function

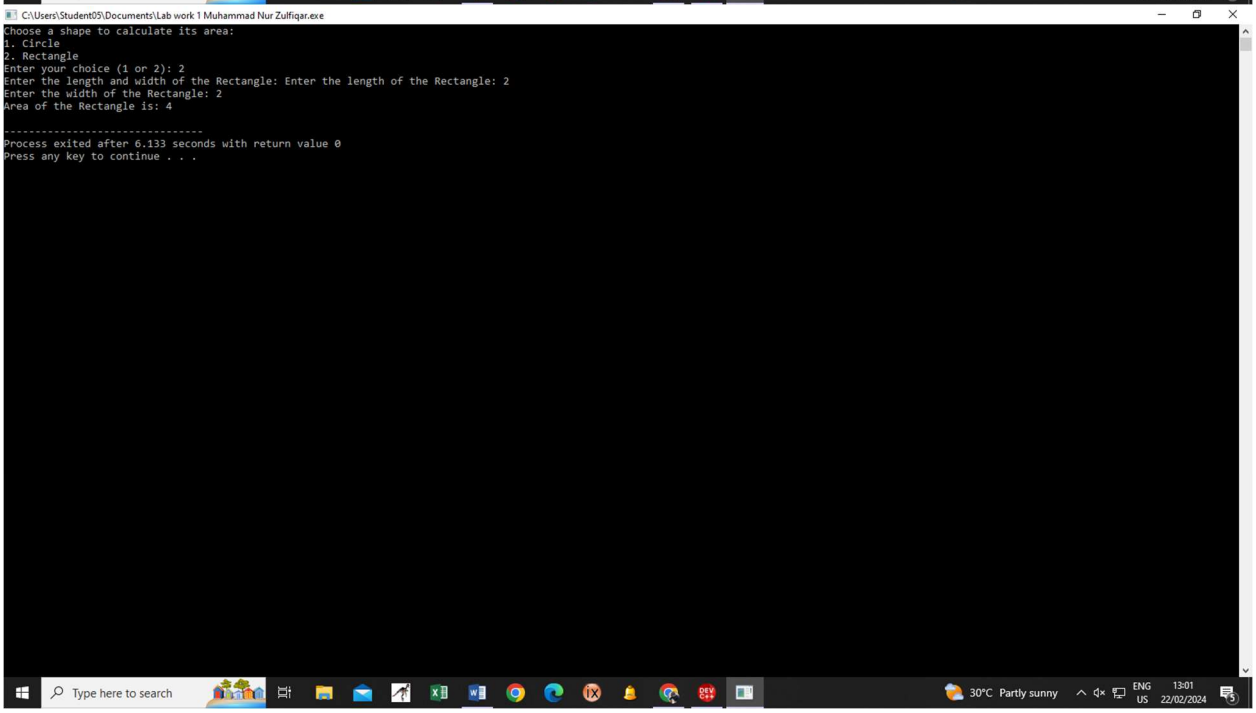
2. **Logic Error**
   - ◉ Fixed the conditions for –ve and 0 value from (||) to (&&)
   - ◉ Added Else Function

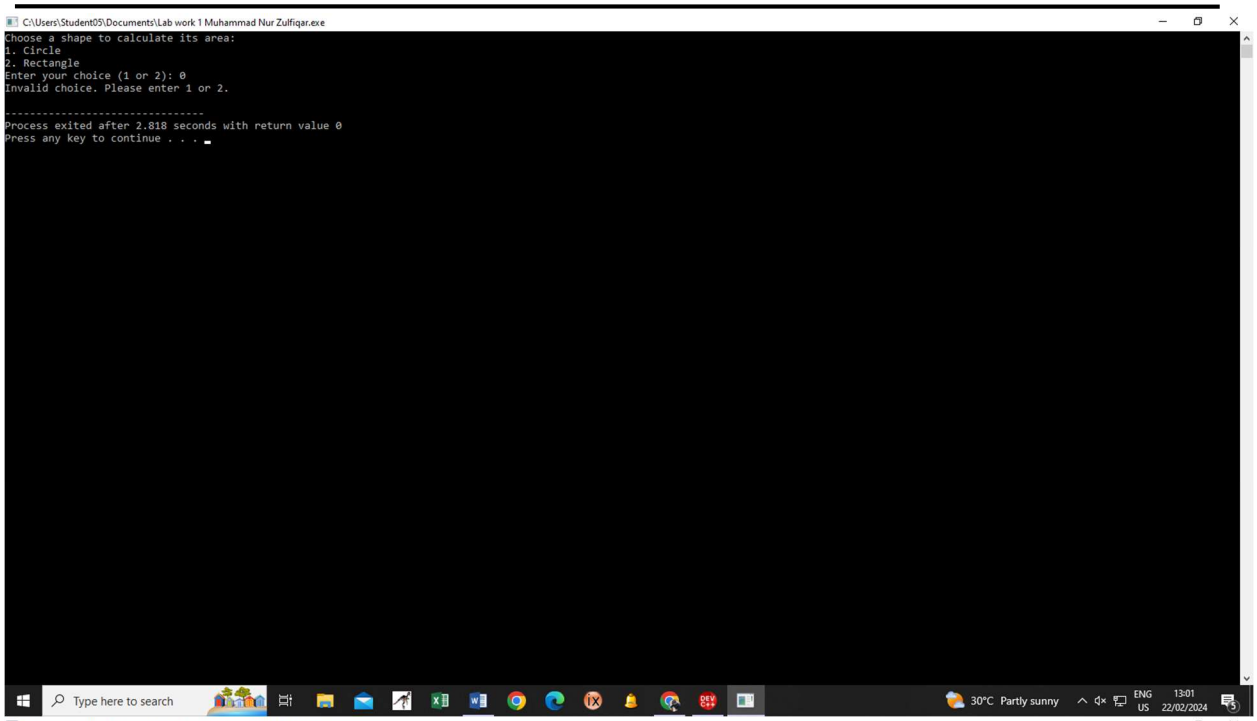
Improved Code: https://github.com/x-Fii/SWC1323

```
/*
Name : Muhammad Nur Zulfiqar Bin Mohd Zulkifli
Id Number : Am2311015179
Program : Lab Work 1 (Calculate area of Circle or Triangle)
*/

#include <iostream>
#include <cmath> // Add this line for pow
using namespace std;

int main() {
   int choice;
   double radius, length, width, area;

   cout << "Choose a shape to calculate its area:" << endl;
   cout << "1. Circle" << endl;
   cout << "2. Rectangle" << endl;
   cout << "Enter your choice (1 or 2): ";
   cin >> choice;

   if (choice == 1) { //Calculate the Area of Circle

      cout << "Enter the radius of the circle: ";
      cin >> radius;

      const double PI = 3.14159; // Add PI declaration
      area = PI * pow(radius, 2);
      cout << "Area of the Circle is: " << area << endl;

   } else if (choice == 2) { //Calculate the Area of Rectangle

      cout << "Enter the length and width of the Rectangle: ";
      cout << "Enter the length of the Rectangle: ";
      cin >> length; //Change to >> for cin
      cout << "Enter the width of the Rectangle: ";
      cin >> width;  //Change to >> for cin

      if ((length > 0) && (width > 0)) { // Change to && for both conditions to avoid -ve and 0 value

         area = length * width;
         cout << "Area of the Rectangle is: " << area << endl;

      } else { //added else

         cout << "Invalid input. Length and Width cannot be negative." << endl;

      }
   } else {

      cout << "Invalid choice. Please enter 1 or 2." << endl;

   }// end of if

   return 0;
}//end of main function
```

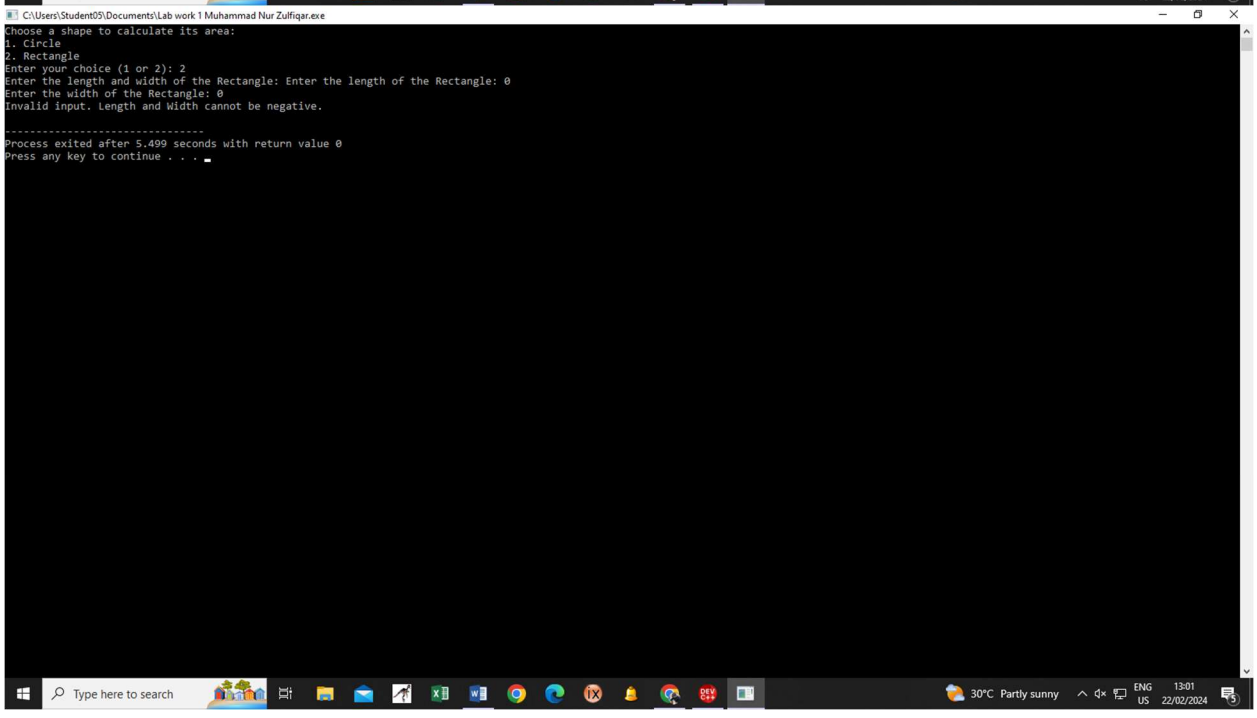
Sample Output :






C:\Users\Student05\Documents\Lab work 1 Muhammad Nur Zulfiqar.exe
Choose a shape to calculate its area:
1. Circle
2. Rectangle
Enter your choice (1 or 2): 0
Invalid choice. Please enter 1 or 2.

Process exited after 2.818 seconds with return value 0
Press any key to continue . . .
Type here to search
30°C Partly sunny
ENG US
13:01
22/02/2024


C:\Users\Student05\Documents\Lab work 1 Muhammad Nur Zulfiqar.exe
Choose a shape to calculate its area:
1. Circle
2. Rectangle
Enter your choice (1 or 2): 2
Enter the length and width of the Rectangle: Enter the length of the Rectangle: 0
Enter the width of the Rectangle: 0
Invalid input. Length and Width cannot be negative.

Process exited after 5.499 seconds with return value 0
Press any key to continue . . .
Type here to search
30°C Partly sunny
ENG US
13:01
22/02/2024