Name: Garrett Jackson

Functions

To be reported on canvas. Create a PDF. Include screenshots of code and execution. Include copy-pasteable text of code. Be careful with variable names and indentation. You must use the templates.

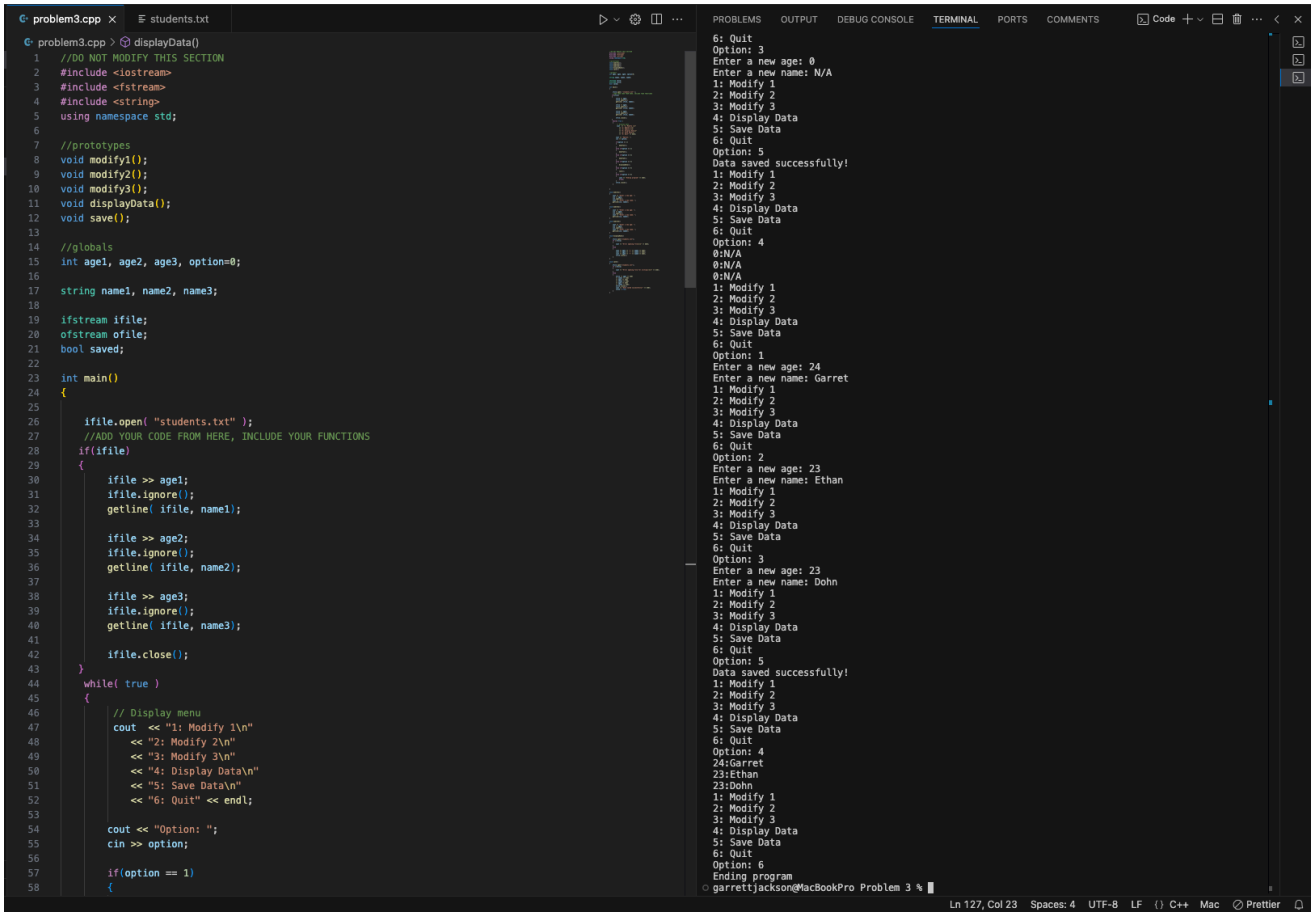
Problem 3. Menu-driven program with file and functions

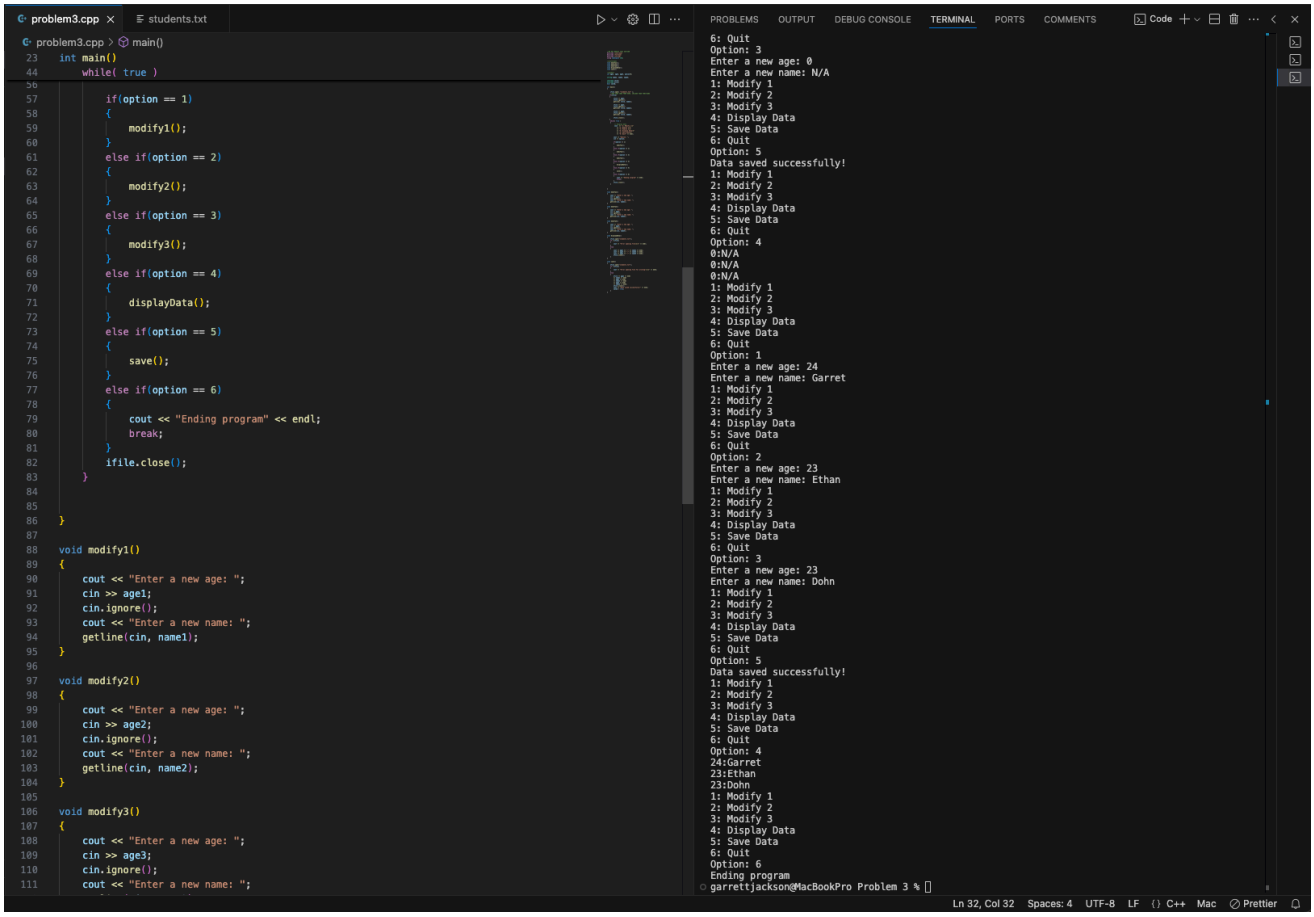
In the lab of Chapter 5, we created a menu-driven program. Modify it so it will have functions for each of the options, instead of having all the code in the main() function.

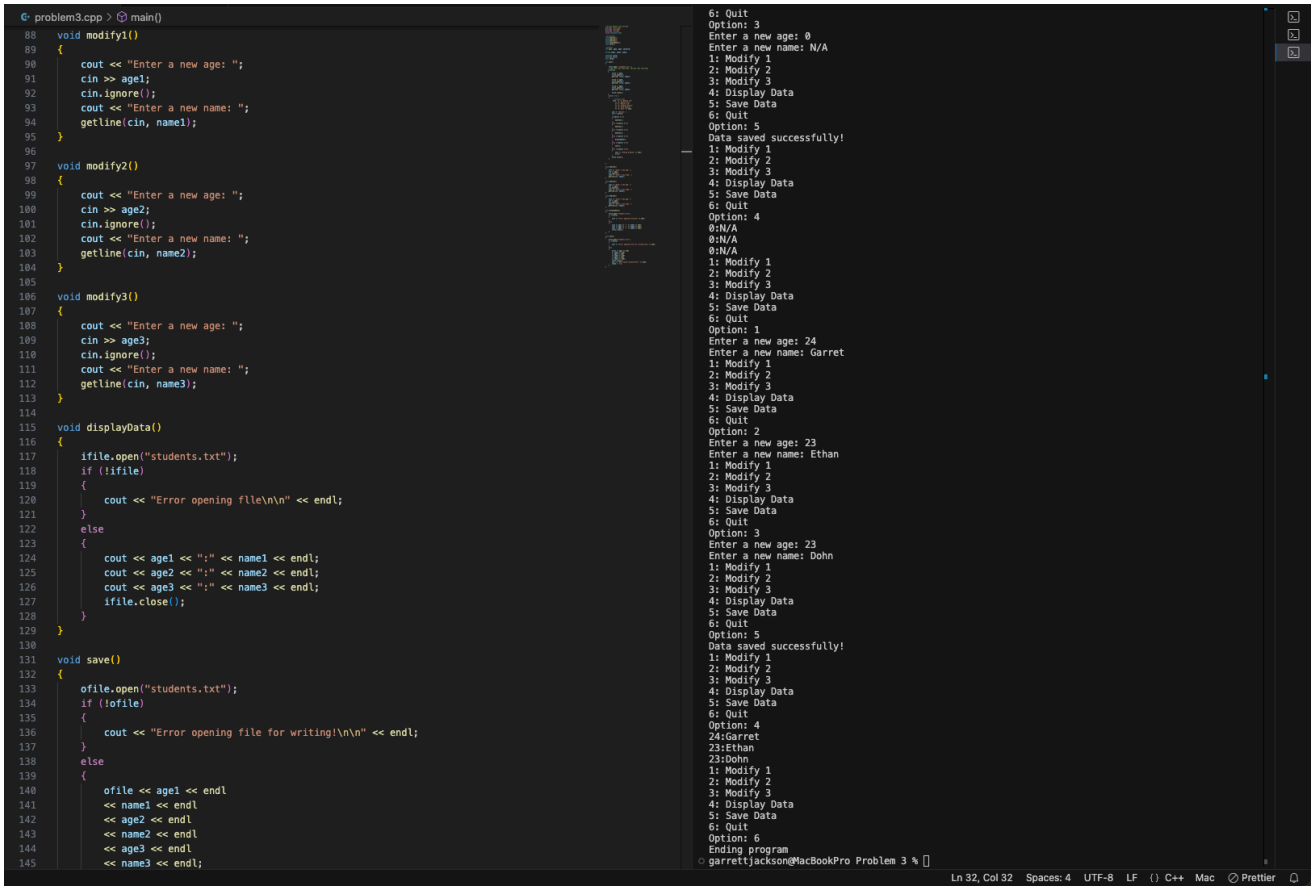
In the code, some variables must be globals, because their values need to be accessible from the functions.

USE THE NEXT TEMPLATE (MANDATORY):

```
//DO NOT MODIFY THIS SECTION
#include <iostream>
#include <fstream>
#include <string>

using namespace std;

//prototypes
void modify1();
void modify2();
void modify3();
void displayData();
void save();

//globals
int age1, age2, age3, option=0;
string name1, name2, name3;
ifstream ifile;
ofstream ofile;
bool saved;

int main()
{
    ifile.open( "students.txt" );
//ADD YOUR CODE FROM HERE, INCLUDE YOUR FUNCTIONS
```


problem3.cpp
students.txt
problem3.cpp > displayData()
//DO NOT MODIFY THIS SECTION
#include <iostream>
#include <fstream>
#include <string>
using namespace std;
//prototypes
void modify1();
void modify2();
void modify3();
void displayData();
void save();
//globals
int age1, age2, age3, option=0;
string name1, name2, name3;
ifstream ifile;
ofstream ofile;
bool saved;
int main()
{
ifile.open("students.txt");
//ADD YOUR CODE FROM HERE, INCLUDE YOUR FUNCTIONS
if(ifile)
{
ifile >> age1;
ifile.ignore();
getline(ifile, name1);
ifile >> age2;
ifile.ignore();
getline(ifile, name2);
ifile >> age3;
ifile.ignore();
getline(ifile, name3);
ifile.close();
}
while(true)
{
// Display menu
cout << "1: Modify 1\n"
<< "2: Modify 2\n"
<< "3: Modify 3\n"
<< "4: Display Data\n"
<< "5: Save Data\n"
<< "6: Quit" << endl;
cout << "Option: ";
cin >> option;
if(option == 1)
{
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS COMMENTS
Code
6: Quit
Option: 3
Enter a new age: 0
Enter a new name: N/A
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 5
Data saved successfully!
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 4
0:N/A
0:N/A
0:N/A
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 1
Enter a new age: 24
Enter a new name: Garret
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 2
Enter a new age: 23
Enter a new name: Ethan
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 3
Enter a new age: 23
Enter a new name: Dohn
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 5
Data saved successfully!
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 4
24:Garret
23:Ethan
23:Dohn
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 6
Ending program
garrettjackson@MacBookPro Problem 3 %
Ln 127, Col 23 Spaces: 4 UTF-8 LF {} C++ Mac Prettier


problem3.cpp
students.txt
problem3.cpp > main()
int main()
while(true)
if(option == 1)
modify1();
else if(option == 2)
modify2();
else if(option == 3)
modify3();
else if(option == 4)
displayData();
else if(option == 5)
save();
else if(option == 6)
cout << "Ending program" << endl;
break;
ifile.close();
void modify1()
cout << "Enter a new age: ";
cin >> age1;
cin.ignore();
cout << "Enter a new name: ";
getline(cin, name1);
void modify2()
cout << "Enter a new age: ";
cin >> age2;
cin.ignore();
cout << "Enter a new name: ";
getline(cin, name2);
void modify3()
cout << "Enter a new age: ";
cin >> age3;
cin.ignore();
cout << "Enter a new name: ";
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS COMMENTS
Code
6: Quit
Option: 3
Enter a new age: 0
Enter a new name: N/A
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 5
Data saved successfully!
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 4
0:N/A
0:N/A
0:N/A
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 1
Enter a new age: 24
Enter a new name: Garret
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 2
Enter a new age: 23
Enter a new name: Ethan
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 3
Enter a new age: 23
Enter a new name: Dohn
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 5
Data saved successfully!
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 4
24:Garret
23:Ethan
23:Dohn
1: Modify 1
2: Modify 2
3: Modify 3
4: Display Data
5: Save Data
6: Quit
Option: 6
Ending program
garrettjackson@MacBookPro Problem 3 %
Ln 32, Col 32 Spaces: 4 UTF-8 LF { } C++ Mac Prettier



//DO NOT MODIFY THIS SECTION

#include <iostream>

#include <fstream>

#include <string>

using namespace std;

//prototypes

void modify1();

void modify2();

void modify3();

void displayData();

void save();

//globals

int age1, age2, age3, option=0;

```
string name1, name2, name3;

ifstream ifile;
ofstream ofile;
bool saved;

int main()
{

   ifile.open( "students.txt" );
   //ADD YOUR CODE FROM HERE, INCLUDE YOUR FUNCTIONS
  if(ifile)
  {
      ifile >> age1;
      ifile.ignore();
      getline( ifile, name1);

      ifile >> age2;
      ifile.ignore();
      getline( ifile, name2);

      ifile >> age3;
      ifile.ignore();
      getline( ifile, name3);

      ifile.close();
  }
   while( true )
   {
```

```
 // Display menu
 cout  << "1: Modify 1\n"
    << "2: Modify 2\n"
    << "3: Modify 3\n"
    << "4: Display Data\n"
    << "5: Save Data\n"
    << "6: Quit" << endl;

cout << "Option: ";
cin >> option;

if(option == 1)
{
   modify1();
}
else if(option == 2)
{
   modify2();
}
else if(option == 3)
{
   modify3();
}
else if(option == 4)
{
   displayData();
}
else if(option == 5)
{
   save();
```

```
        }
        else if(option == 6)
        {
            cout << "Ending program" << endl;
            break;
        }
        ifile.close();
    }



}

void modify1()
{
    cout << "Enter a new age: ";
    cin >> age1;
    cin.ignore();
    cout << "Enter a new name: ";
    getline(cin, name1);
}

void modify2()
{
    cout << "Enter a new age: ";
    cin >> age2;
    cin.ignore();
    cout << "Enter a new name: ";
    getline(cin, name2);
}
```

```
void modify3()
{
   cout << "Enter a new age: ";
   cin >> age3;
   cin.ignore();
   cout << "Enter a new name: ";
   getline(cin, name3);
}

void displayData()
{
   ifile.open("students.txt");
   if (!ifile)
   {
      cout << "Error opening flle\n\n" << endl;
   }
   else
   {
      cout << age1 << ":" << name1 << endl;
      cout << age2 << ":" << name2 << endl;
      cout << age3 << ":" << name3 << endl;
      ifile.close();
   }
}

void save()
{
   ofile.open("students.txt");
   if (!ofile)
   {
```

```
        cout << "Error opening file for writing!\n\n" << endl;
    }
    else
    {
        ofile << age1 << endl
        << name1 << endl
        << age2 << endl
        << name2 << endl
        << age3 << endl
        << name3 << endl;
        ofile.close();
        cout << "Data saved successfully!" << endl;
        saved = true;
    }
}
```

Problem 4. Geometry Calculator with functions and menu

Make a C++ program that calculates the area of different geometric shapes: circle, rectangle, and triangle. The program should allow the user to choose a shape, enter the required dimensions, and receive the computed area. All arguments should be passed by value.

Implement **a loop** to allow repeated calculations until the user chooses to exit.

It must have the following functions:

- displayMenu(): Displays a menu with options: Circle, Rectangle, Triangle, and Exit.
- calculateCircleArea(double): Accepts the radius as a parameter (by value) and returns the area using the formula:

$$A=\pi \times r^2$$

- calculateRectangleArea(double, double): Accepts the length and width (by value) and returns the area using the formula:

$$A=\text{length} \times \text{width}$$

- calculateTriangleArea(double, double): Accepts the base and height (by value) and returns the area using the formula:

$$A=1/2\times base\times height$$

- displayResult(double, std::string): Accepts the computed area and shape name (by value) and displays the result.

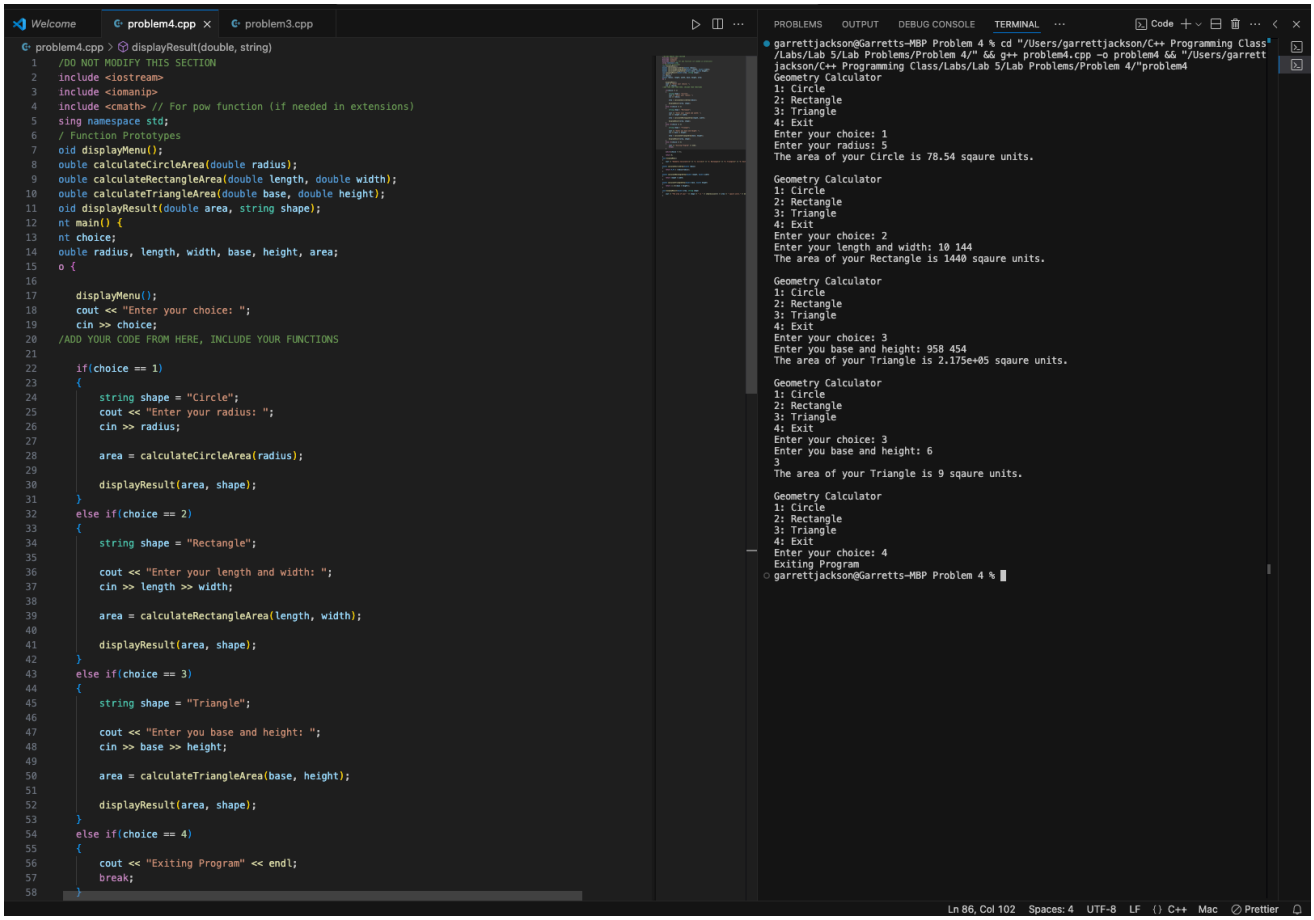
USE THE NEXT TEMPLATE (MANDATORY):

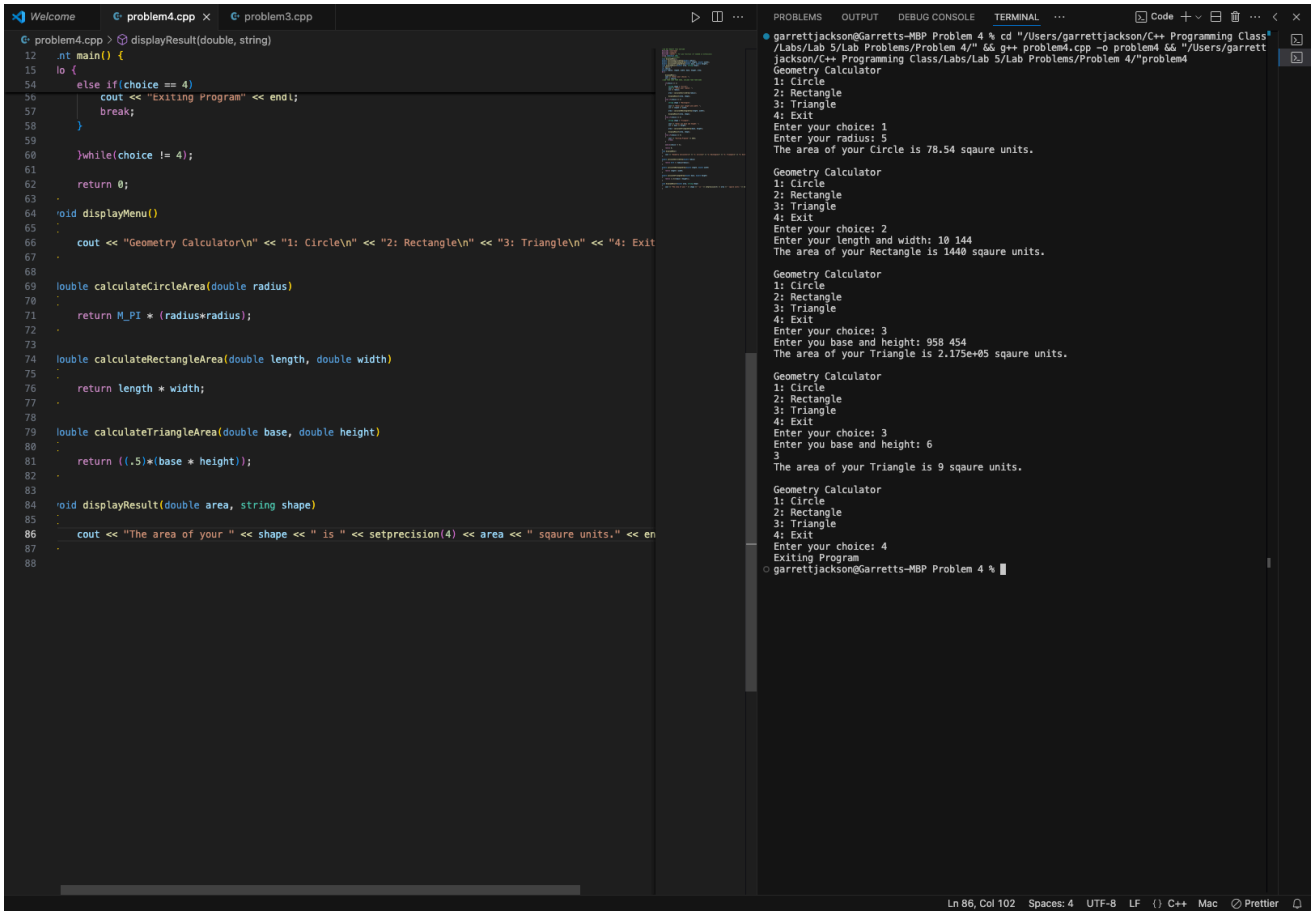
```
//DO NOT MODIFY THIS SECTION
#include <iostream>
#include <iomanip>
#include <cmath>   // For pow function (if needed in extensions)

using namespace std;

// Function Prototypes
void displayMenu();
double calculateCircleArea(double radius);
double calculateRectangleArea(double length, double width);
double calculateTriangleArea(double base, double height);
void displayResult(double area, string shape);

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

    do {
        displayMenu();
        cout << "Enter your choice: ";
        cin >> choice;

//ADD YOUR CODE FROM HERE, INCLUDE YOUR FUNCTIONS
```

Example of execution:

```
Geometry Calculator
1. Circle
2. Rectangle
3. Triangle
4. Exit
Enter your choice: 1
Enter the radius: 5
The area of the circle is 78.54 square units.

Enter your choice: 2
Enter the length: 8
Enter the width: 4
The area of the rectangle is 32 square units.

Enter your choice: 3
Enter the base: 6
Enter the height: 3
The area of the triangle is 9 square units.

Enter your choice: 4
```

Goodbye!


Welcome
problem4.cpp
problem3.cpp
problem4.cpp > displayResult(double, string)
/DO NOT MODIFY THIS SECTION
include <iostream>
include <iomanip>
include <cmath> // For pow function (if needed in extensions)
sing namespace std;
/ Function Prototypes
oid displayMenu();
ouble calculateCircleArea(double radius);
ouble calculateRectangleArea(double length, double width);
ouble calculateTriangleArea(double base, double height);
oid displayResult(double area, string shape);
nt main() {
nt choice;
ouble radius, length, width, base, height, area;
o {
displayMenu();
cout << "Enter your choice: ";
cin >> choice;
/ADD YOUR CODE FROM HERE, INCLUDE YOUR FUNCTIONS
if(choice == 1)
{
string shape = "Circle";
cout << "Enter your radius: ";
cin >> radius;
area = calculateCircleArea(radius);
displayResult(area, shape);
}
else if(choice == 2)
{
string shape = "Rectangle";
cout << "Enter your length and width: ";
cin >> length >> width;
area = calculateRectangleArea(length, width);
displayResult(area, shape);
}
else if(choice == 3)
{
string shape = "Triangle";
cout << "Enter you base and height: ";
cin >> base >> height;
area = calculateTriangleArea(base, height);
displayResult(area, shape);
}
else if(choice == 4)
{
cout << "Exiting Program" << endl;
break;
}
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
Code
garrettjackson@Garretts-MBP Problem 4 % cd "/Users/garrettjackson/C++ Programming Class/Labs/Lab 5/Lab Problems/Problem 4/" && g++ problem4.cpp -o problem4 && "/Users/garrettjackson/C++ Programming Class/Labs/Lab 5/Lab Problems/Problem 4/"problem4
Geometry Calculator
1: Circle
2: Rectangle
3: Triangle
4: Exit
Enter your choice: 1
Enter your radius: 5
The area of your Circle is 78.54 sqaure units.
Geometry Calculator
1: Circle
2: Rectangle
3: Triangle
4: Exit
Enter your choice: 2
Enter your length and width: 10 144
The area of your Rectangle is 1440 sqaure units.
Geometry Calculator
1: Circle
2: Rectangle
3: Triangle
4: Exit
Enter your choice: 3
Enter you base and height: 958 454
The area of your Triangle is 2.175e+05 sqaure units.
Geometry Calculator
1: Circle
2: Rectangle
3: Triangle
4: Exit
Enter your choice: 3
Enter you base and height: 6
3
The area of your Triangle is 9 sqaure units.
Geometry Calculator
1: Circle
2: Rectangle
3: Triangle
4: Exit
Enter your choice: 4
Exiting Program
garrettjackson@Garretts-MBP Problem 4 %
Ln 86, Col 102
Spaces: 4
UTF-8
LF
C++
Mac
Prettier




```
//DO NOT MODIFY THIS SECTION
#include <iostream>
#include <iomanip>
#include <cmath> // For pow function (if needed in extensions)
using namespace std;
// Function Prototypes
void displayMenu();
double calculateCircleArea(double radius);
double calculateRectangleArea(double length, double width);
double calculateTriangleArea(double base, double height);
void displayResult(double area, string shape);
int main() {
int choice;
double radius, length, width, base, height, area;
do {

    displayMenu();
    cout << "Enter your choice: ";
    cin >> choice;
//ADD YOUR CODE FROM HERE, INCLUDE YOUR FUNCTIONS

    if(choice == 1)
    {
```

```
        string shape = "Circle";
        cout << "Enter your radius: ";
        cin >> radius;

        area = calculateCircleArea(radius);

        displayResult(area, shape);
    }
    else if(choice == 2)
    {
        string shape = "Rectangle";

        cout << "Enter your length and width: ";
        cin >> length >> width;

        area = calculateRectangleArea(length, width);

        displayResult(area, shape);
    }
    else if(choice == 3)
    {
        string shape = "Triangle";

        cout << "Enter you base and height: ";
        cin >> base >> height;

        area = calculateTriangleArea(base, height);

        displayResult(area, shape);
    }
    else if(choice == 4)
    {
        cout << "Exiting Program" << endl;
        break;
    }

    }while(choice != 4);

    return 0;
}
void displayMenu()
{
    cout << "Geometry Calculator\n" << "1: Circle\n" << "2: Rectangle\n" << "3: Triangle\n" << "4:
Exit\n";
}

double calculateCircleArea(double radius)
{
```

```
   return M_PI * (radius*radius);
}

double calculateRectangleArea(double length, double width)
{
   return length * width;
}

double calculateTriangleArea(double base, double height)
{
   return ((.5)*(base * height));
}

void displayResult(double area, string shape)
{
   cout << "The area of your " << shape << " is " << setprecision(4) << area << " square 31units." <<
endl << endl;
}
```