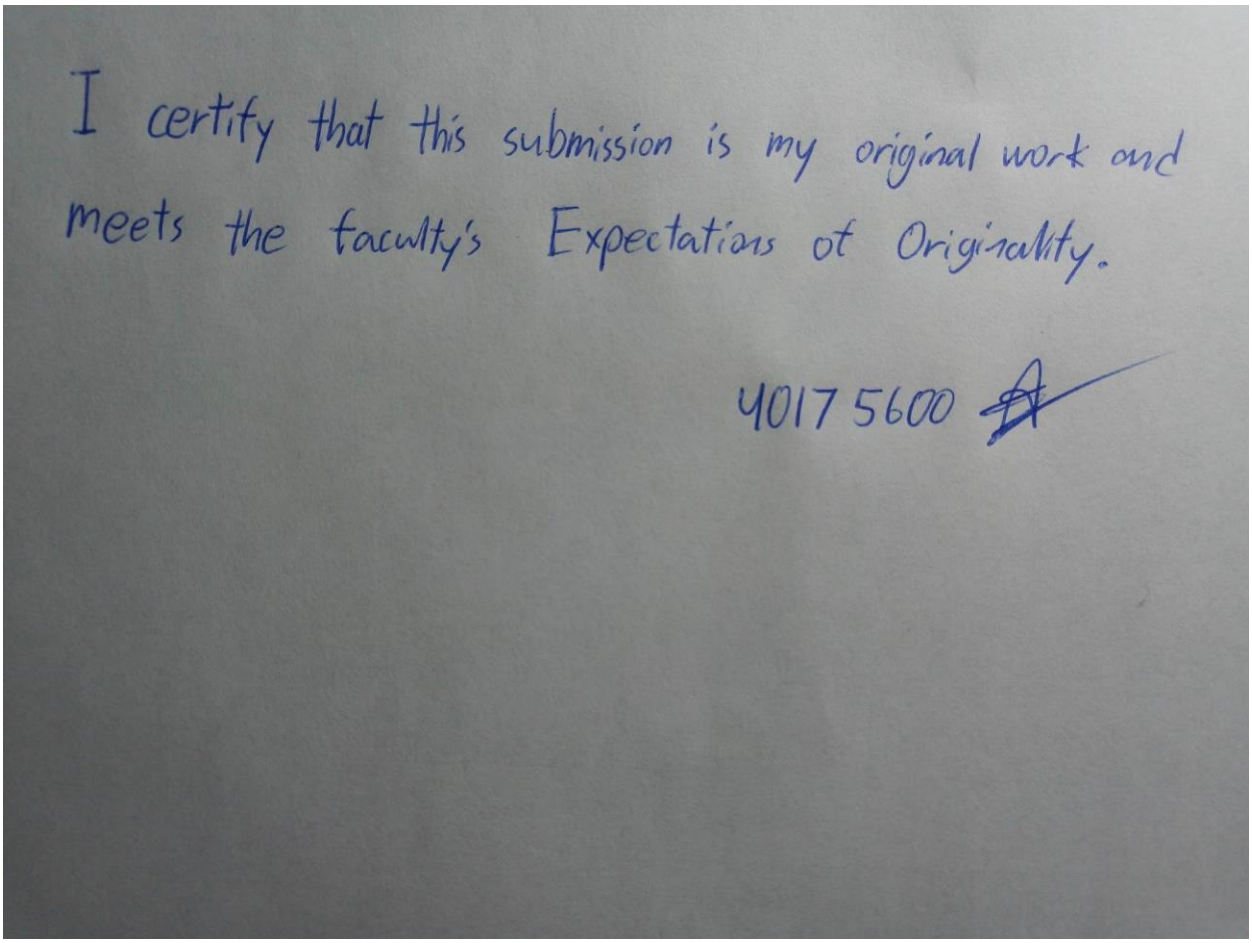
Hei Wang Andre Law

4017 5600

18/02/2021

Assignment 2



Question 1:

Question_1 (Global Scope)

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

// main body of the program
int main() {
    double kel, fah; // kelvin and fahrenheit variables
    const float kelConst = 273.15; // absolute zero kelvin constant

    // top header layout of the three temperatures with corresponding spacing between
    cout << setw (9) << "Celsius" << setw(15) << "Farhrenheit" << setw(10) << "Kelvin" << endl;

    // for-loop that repeats body code 50 times
    for (double cel = 1; cel <= 50; cel++)
    {
        fah = (cel * 9 / 5) + 32; // celsius to fahrenheit equation
        kel = cel + kelConst; // celsius to kelvin equation

        // 3 version of same output, but different 'setw' to clean up output format
        if (cel <= 9){
            cout << setw(3) << setprecision(0) << cel << fixed; // celsius. 0 decimal place
            cout << setw(14) << setprecision (1) << fah; // fahrenheit, 1 decimal palce
            cout << setw(17) << setprecision(2) << kel << endl; // kelvin, 2 decimal place
        }else if (cel <=37) {
            cout << setw(4) << setprecision(0) << cel << fixed; // celsius, 0 decimal place
            cout << setw(13) << setprecision(1) << fah; // fahrenheit, 1 decimal palce
            cout << setw(17) << setprecision(2) << kel << endl; // kelvin, 2 decimal place
        }
        else {
            cout << setw(4) << setprecision(0) << cel << fixed; // celsius, 0 decimal place
            cout << setw(14) << setprecision(1) << fah; // fahrenheit, 1 decimal palce
            cout << setw(16) << setprecision(2) << kel << endl; // kelvin, 2 decimal place
        }
    }
    return 0;
}
```

Microsoft Visual Studio Debug Console

```
Celsius     Farhrenheit     Kelvin
1           33.8            274.15
2           35.6            275.15
3           37.4            276.15
4           39.2            277.15
5           41.0            278.15
6           42.8            279.15
7           44.6            280.15
8           46.4            281.15
9           48.2            282.15
10          50.0            283.15
11          51.8            284.15
12          53.6            285.15
13          55.4            286.15
14          57.2            287.15
15          59.0            288.15
16          60.8            289.15
17          62.6            290.15
18          64.4            291.15
19          66.2            292.15
20          68.0            293.15
21          69.8            294.15
22          71.6            295.15
23          73.4            296.15
24          75.2            297.15
25          77.0            298.15
26          78.8            299.15
27          80.6            300.15
28          82.4            301.15
29          84.2            302.15
30          86.0            303.15
31          87.8            304.15
32          89.6            305.15
33          91.4            306.15
34          93.2            307.15
35          95.0            308.15
36          96.8            309.15
37          98.6            310.15
38          100.4           311.15
39          102.2           312.15
40          104.0           313.15
41          105.8           314.15
42          107.6           315.15
43          109.4           316.15
44          111.2           317.15
45          113.0           318.15
46          114.8           319.15
47          116.6           320.15
48          118.4           321.15
49          120.2           322.15
50          122.0           323.15

E:\vsCode\Project Location\COEN 243
code 0.
```

100 % No issues found

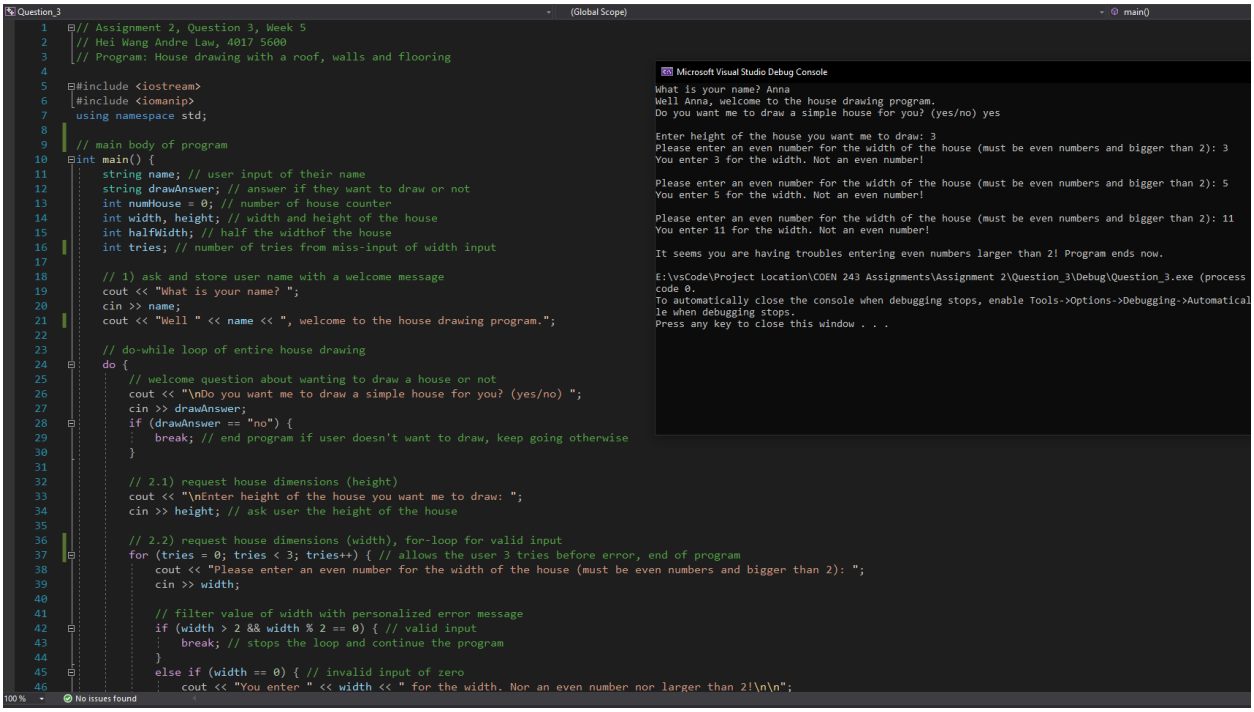
Question 2:

Question_2 (Global Scope)

```cpp
// Assignment 2, Question 2, Week 5
// Hei Wang Andre Law, 4017 5600
// Program: Prime number filter

#include <iostream>
#include <cmath>
using namespace std;

// main body of program
int main() {
    int num; // user input integer
    bool isNotPrime = true; // true means it is indeed NOT prime

    // ask user to input an integer
    cout << "Enter an integer: ";
    cin >> num; // store that integer into 'num'

    // anything below 1 isn't a prime number, continue otherwise
    if (num > 1){
        isNotPrime = false; // set integer being prime and prove otherwise

        // prime only 2 factors, themselves and 1, so don't loop unless i < num
        for (double i = 2; i < num; ++i) {
            // check if exists WHOLE divisible factor
            if (floor(num / i) == num / i) {
                isNotPrime = true; // set integer being NOT prime
                break; // break loop because there is a divisible factor
            }
        }
    }
    // display results based on the boolean
    if (isNotPrime) {
        cout << endl << num << " is NOT a prime number." << endl;
    }
    else {
        cout << endl << num << " is a prime number." << endl;
    }
    return 0;
}
```

```
Microsoft Visual Studio Debug
Enter an integer: 7

7 is a prime number.

E:\vsCode\Project Locati
code 0.
To automatically close t
le when debugging stops
Press any key to close t
```

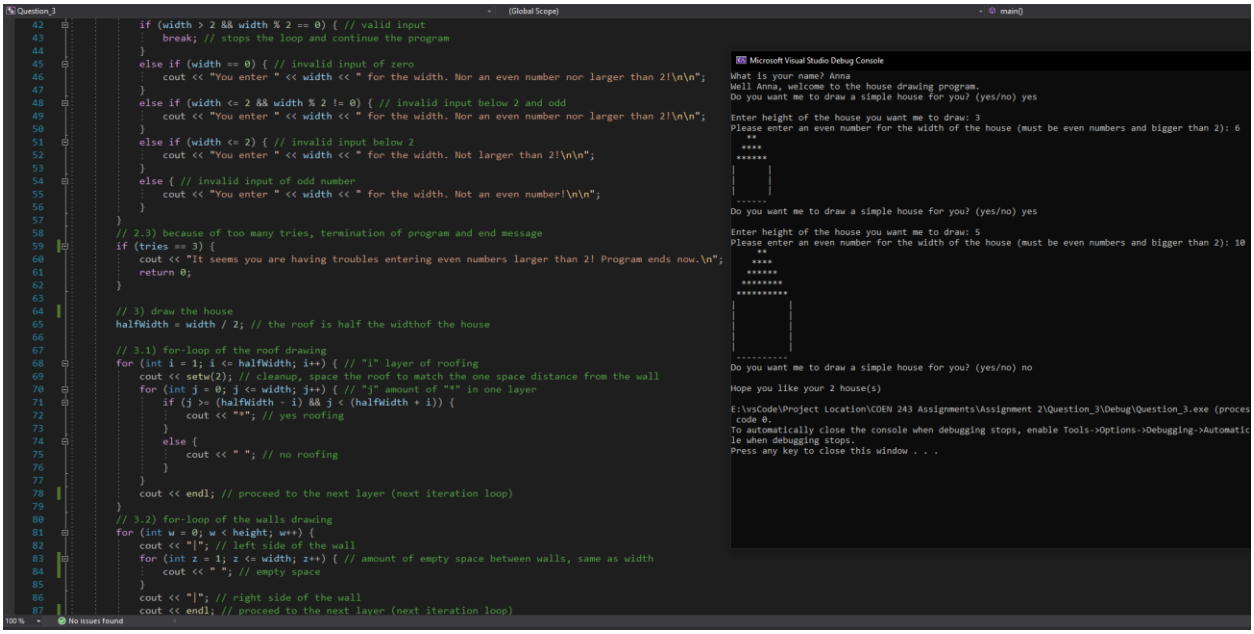
Question 3: (part 1)



```cpp
// Assignment 2, Question 3, Week 5
// Hei Wang Andre Law, 4017 5600
// Program: House drawing with a roof, walls and flooring

#include <iostream>
#include <iomanip>
using namespace std;

// main body of program
int main() {
    string name; // user input of their name
    string drawAnswer; // answer if they want to draw or not
    int numHouse = 0; // number of house counter
    int width, height; // width and height of the house
    int halfWidth; // half the widthof the house
    int tries; // number of tries from miss-input of width input

    // 1) ask and store user name with a welcome message
    cout << "What is your name? ";
    cin >> name;
    cout << "Well " << name << ", welcome to the house drawing program.";

    // do-while loop of entire house drawing
    do {
        // welcome question about wanting to draw a house or not
        cout << "\nDo you want me to draw a simple house for you? (yes/no) ";
        cin >> drawAnswer;
        if (drawAnswer == "no") {
            break; // end program if user doesn't want to draw, keep going otherwise
        }

        // 2.1) request house dimensions (height)
        cout << "\nEnter height of the house you want me to draw: ";
        cin >> height; // ask user the height of the house

        // 2.2) request house dimensions (width), for-loop for valid input
        for (tries = 0; tries < 3; tries++) { // allows the user 3 tries before error, end of program
            cout << "Please enter an even number for the width of the house (must be even numbers and bigger than 2): ";
            cin >> width;

            // filter value of width with personalized error message
            if (width > 2 && width % 2 == 0) { // valid input
                break; // stops the loop and continue the program
            }
            else if (width == 0) { // invalid input of zero
                cout << "You enter " << width << " for the width. Nor an even number nor larger than 2!\n\n";
```

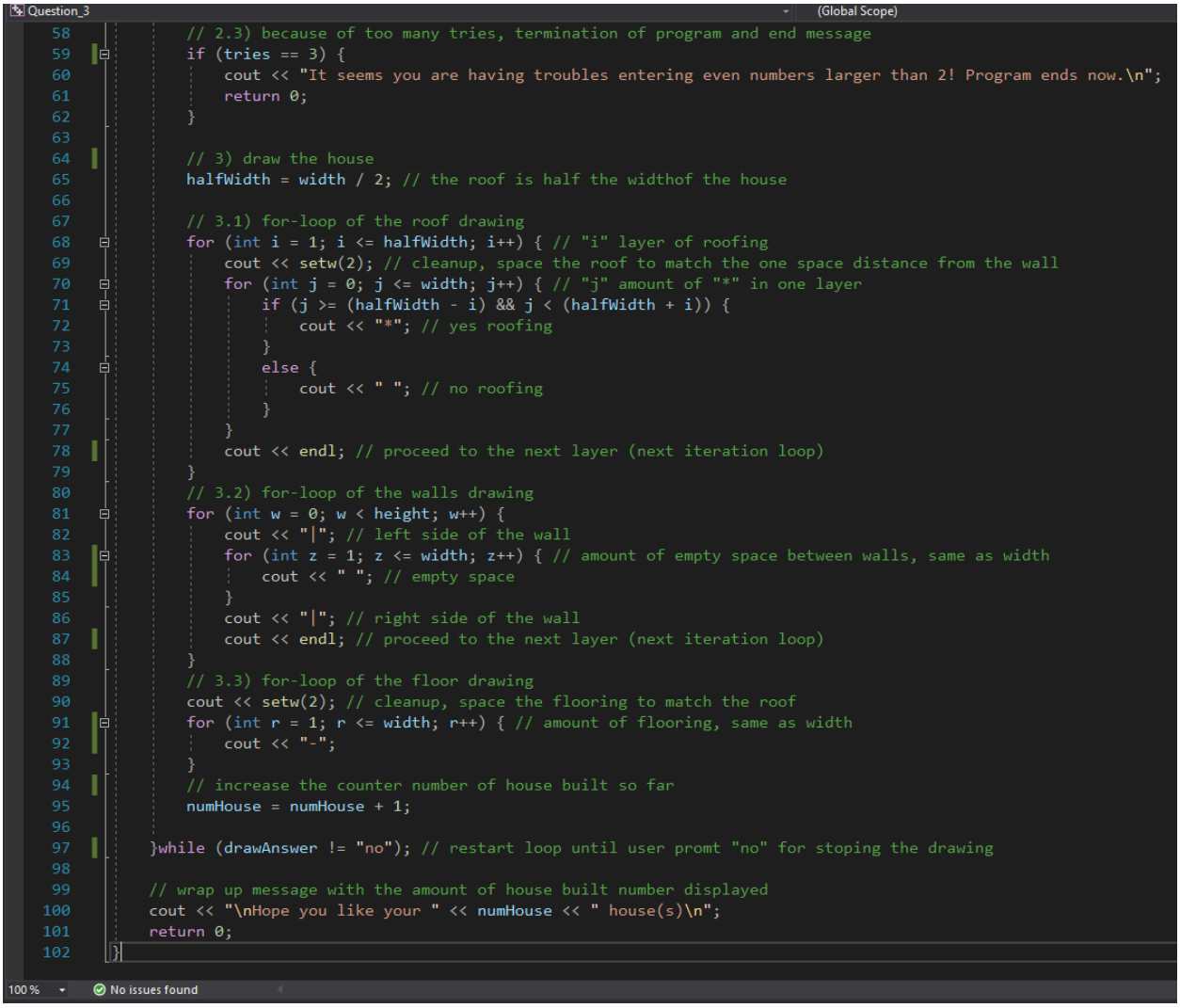
```
Microsoft Visual Studio Debug Console
What is your name? Anna
Well Anna, welcome to the house drawing program.
Do you want me to draw a simple house for you? (yes/no) yes

Enter height of the house you want me to draw: 3
Please enter an even number for the width of the house (must be even numbers and bigger than 2): 3
You enter 3 for the width. Not an even number!

Please enter an even number for the width of the house (must be even numbers and bigger than 2): 5
You enter 5 for the width. Not an even number!

Please enter an even number for the width of the house (must be even numbers and bigger than 2): 11
You enter 11 for the width. Not an even number!

It seems you are having troubles entering even numbers larger than 2! Program ends now.

E:\vsCode\Project Location\COEN 243 Assignments\Assignment 2\Question_3\Debug\Question_3.exe (process
code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatical
le when debugging stops.
Press any key to close this window . . .
```

Question 3: (part 2)



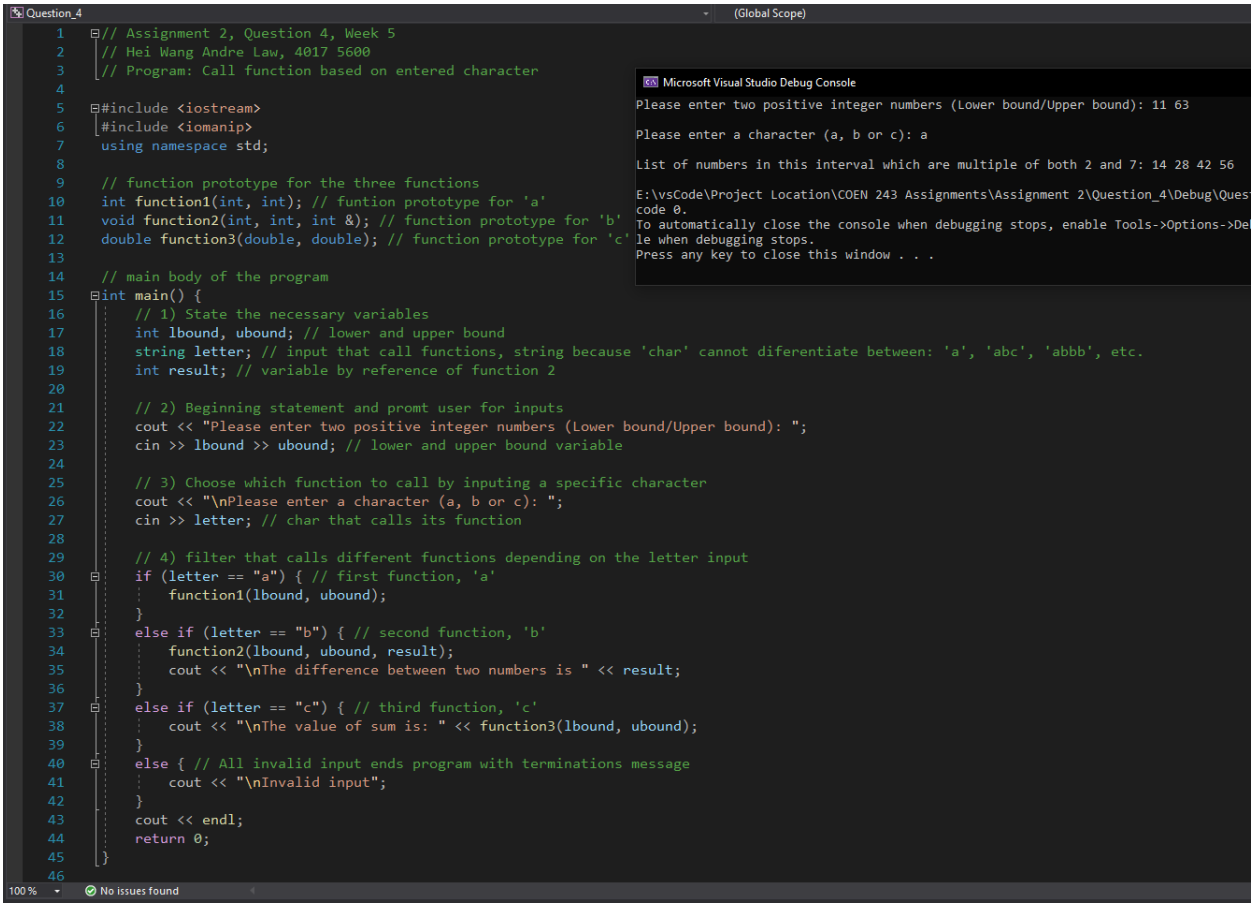
```
Question_3                                                    (Global Scope)                                                    main()
42              if (width > 2 && width % 2 == 0) { // valid input
43                  break; // stops the loop and continue the program
44              }
45              else if (width == 0) { // invalid input of zero
46                  cout << "You enter " << width << " for the width. Nor an even number nor larger than 2!\n\n";
47              }
48              else if (width <= 2 && width % 2 != 0) { // invalid input below 2 and odd
49                  cout << "You enter " << width << " for the width. Nor an even number nor larger than 2!\n\n";
50              }
51              else if (width <= 2) { // invalid input below 2
52                  cout << "You enter " << width << " for the width. Not larger than 2!\n\n";
53              }
54              else { // invalid input of odd number
55                  cout << "You enter " << width << " for the width. Not an even number!\n\n";
56              }
57          }
58          // 2.3) because of too many tries, termination of program and end message
59          if (tries == 3) {
60              cout << "It seems you are having troubles entering even numbers larger than 2! Program ends now.\n";
61              return 0;
62          }
63
64          // 3) draw the house
65          halfWidth = width / 2; // the roof is half the widthof the house
66
67          // 3.1) for-loop of the roof drawing
68          for (int i = 1; i <= halfWidth; i++) { // "i" layer of roofing
69              cout << setw(2); // cleanup, space the roof to match the one space distance from the wall
70              for (int j = 0; j <= width; j++) { // "j" amount of "*" in one layer
71                  if (j >= (halfWidth - i) && j < (halfWidth + i)) {
72                      cout << "*"; // yes roofing
73                  }
74                  else {
75                      cout << " "; // no roofing
76                  }
77              }
78              cout << endl; // proceed to the next layer (next iteration loop)
79          }
80          // 3.2) for-loop of the walls drawing
81          for (int w = 0; w < height; w++) {
82              cout << "|"; // left side of the wall
83              for (int z = 1; z <= width; z++) { // amount of empty space between walls, same as width
84                  cout << " "; // empty space
85              }
86              cout << "|"; // right side of the wall
87              cout << endl; // proceed to the next layer (next iteration loop)
100 %   No issues found

Microsoft Visual Studio Debug Console
What is your name? Anna
Well Anna, welcome to the house drawing program.
Do you want me to draw a simple house for you? (yes/no) yes

Enter height of the house you want me to draw: 3
Please enter an even number for the width of the house (must be even numbers and bigger than 2): 6
   **
  ****
 ******
|      |
|      |
|      |
 ------
Do you want me to draw a simple house for you? (yes/no) yes

Enter height of the house you want me to draw: 5
Please enter an even number for the width of the house (must be even numbers and bigger than 2): 10
     **
    ****
   ******
  ********
 **********
|          |
|          |
|          |
|          |
|          |
 ----------
Do you want me to draw a simple house for you? (yes/no) no

Hope you like your 2 house(s)

E:\vsCode\Project Location\COEN 243 Assignments\Assignment 2\Question_3\Debug\Question_3.exe (proces
 code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatic
le when debugging stops.
Press any key to close this window . . .
```

Question 3: (part 3)




```
58          // 2.3) because of too many tries, termination of program and end message
59          if (tries == 3) {
60              cout << "It seems you are having troubles entering even numbers larger than 2! Program ends now.\n";
61              return 0;
62          }
63
64          // 3) draw the house
65          halfWidth = width / 2; // the roof is half the widthof the house
66
67          // 3.1) for-loop of the roof drawing
68          for (int i = 1; i <= halfWidth; i++) { // "i" layer of roofing
69              cout << setw(2); // cleanup, space the roof to match the one space distance from the wall
70              for (int j = 0; j <= width; j++) { // "j" amount of "*" in one layer
71                  if (j >= (halfWidth - i) && j < (halfWidth + i)) {
72                      cout << "*"; // yes roofing
73                  }
74                  else {
75                      cout << " "; // no roofing
76                  }
77              }
78              cout << endl; // proceed to the next layer (next iteration loop)
79          }
80          // 3.2) for-loop of the walls drawing
81          for (int w = 0; w < height; w++) {
82              cout << "|"; // left side of the wall
83              for (int z = 1; z <= width; z++) { // amount of empty space between walls, same as width
84                  cout << " "; // empty space
85              }
86              cout << "|"; // right side of the wall
87              cout << endl; // proceed to the next layer (next iteration loop)
88          }
89          // 3.3) for-loop of the floor drawing
90          cout << setw(2); // cleanup, space the flooring to match the roof
91          for (int r = 1; r <= width; r++) { // amount of flooring, same as width
92              cout << "-";
93          }
94          // increase the counter number of house built so far
95          numHouse = numHouse + 1;
96
97      }while (drawAnswer != "no"); // restart loop until user promt "no" for stoping the drawing
98
99      // wrap up message with the amount of house built number displayed
100     cout << "\nHope you like your " << numHouse << " house(s)\n";
101     return 0;
102 }
```

Question 4: (part 1)



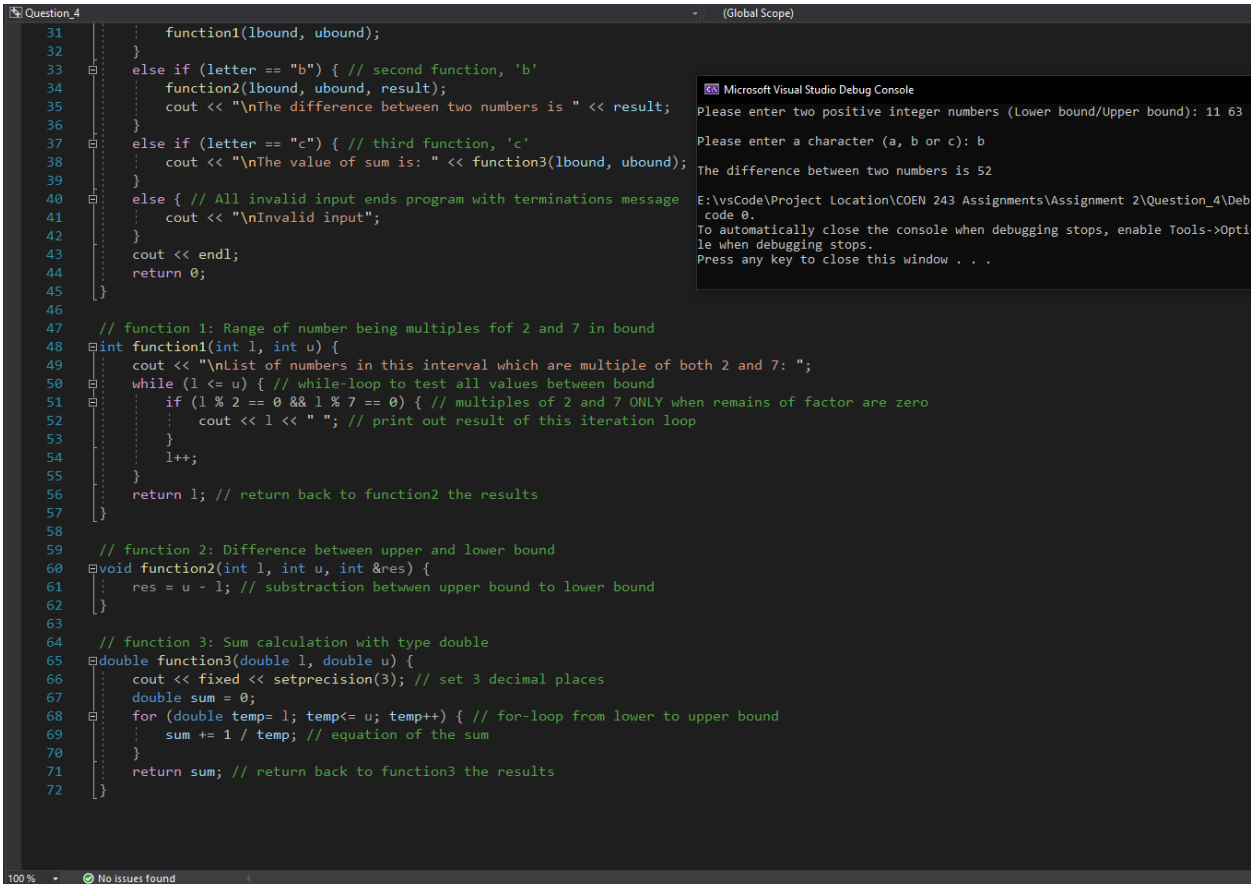
```
Question_4                                                    (Global Scope)
```

```cpp
// Assignment 2, Question 4, Week 5
// Hei Wang Andre Law, 4017 5600
// Program: Call function based on entered character

#include <iostream>
#include <iomanip>
using namespace std;

// function prototype for the three functions
int function1(int, int); // funtion prototype for 'a'
void function2(int, int, int &); // function prototype for 'b'
double function3(double, double); // function prototype for 'c'

// main body of the program
int main() {
    // 1) State the necessary variables
    int lbound, ubound; // lower and upper bound
    string letter; // input that call functions, string because 'char' cannot diferentiate between: 'a', 'abc', 'abbb', etc.
    int result; // variable by reference of function 2

    // 2) Beginning statement and promt user for inputs
    cout << "Please enter two positive integer numbers (Lower bound/Upper bound): ";
    cin >> lbound >> ubound; // lower and upper bound variable

    // 3) Choose which function to call by inputing a specific character
    cout << "\nPlease enter a character (a, b or c): ";
    cin >> letter; // char that calls its function

    // 4) filter that calls different functions depending on the letter input
    if (letter == "a") { // first function, 'a'
        function1(lbound, ubound);
    }
    else if (letter == "b") { // second function, 'b'
        function2(lbound, ubound, result);
        cout << "\nThe difference between two numbers is " << result;
    }
    else if (letter == "c") { // third function, 'c'
        cout << "\nThe value of sum is: " << function3(lbound, ubound);
    }
    else { // All invalid input ends program with terminations message
        cout << "\nInvalid input";
    }
    cout << endl;
    return 0;
}
```

```
100 %   No issues found
```

```
Microsoft Visual Studio Debug Console
Please enter two positive integer numbers (Lower bound/Upper bound): 11 63

Please enter a character (a, b or c): a

List of numbers in this interval which are multiple of both 2 and 7: 14 28 42 56

E:\vsCode\Project Location\COEN 243 Assignments\Assignment 2\Question_4\Debug\Ques
code 0.
To automatically close the console when debugging stops, enable Tools->Options->De
le when debugging stops.
Press any key to close this window . . .
```

Question 4: (part 2)

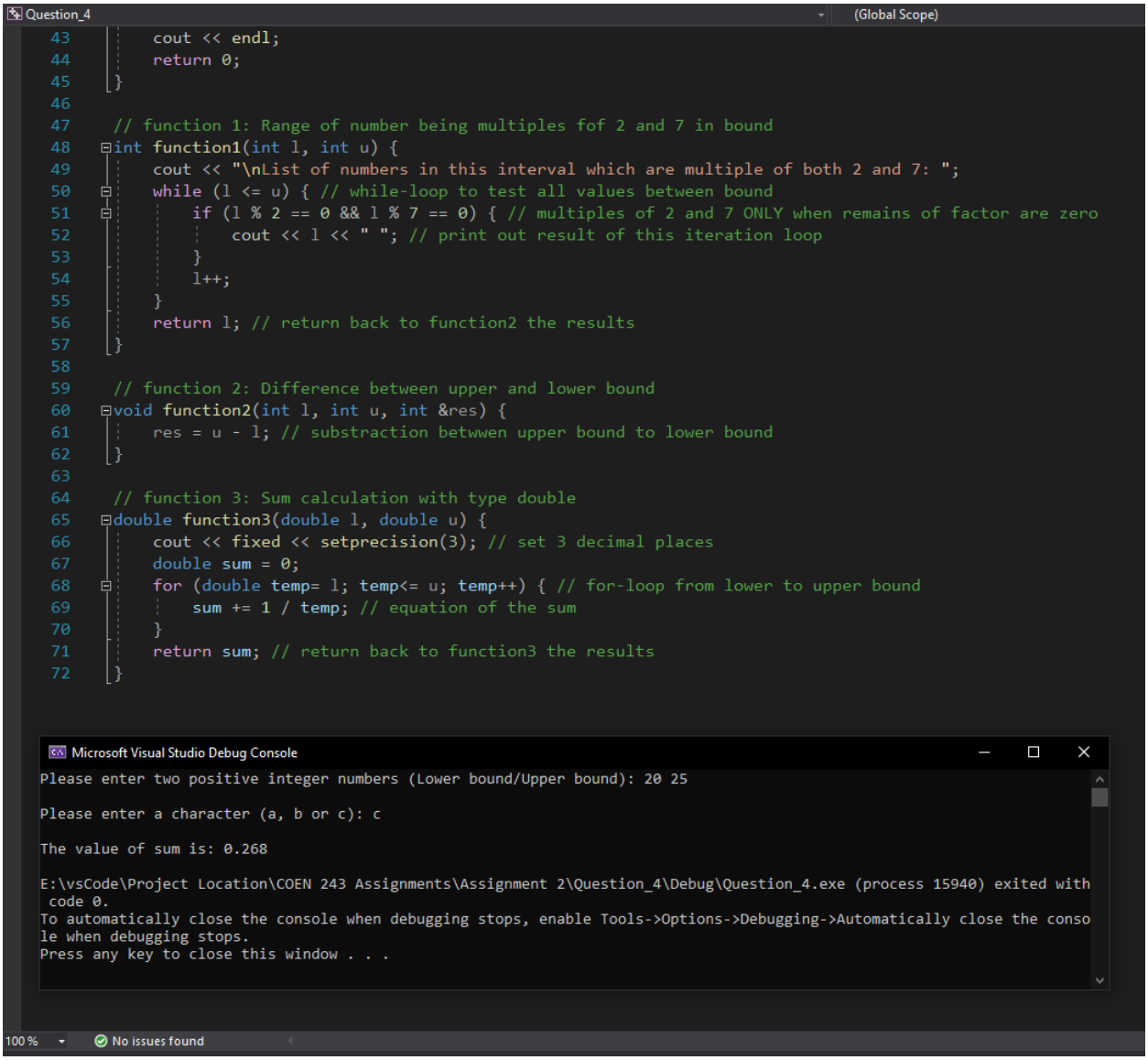


```
Question_4                                                    (Global Scope)
31          function1(lbound, ubound);
32      }
33      else if (letter == "b") { // second function, 'b'
34          function2(lbound, ubound, result);
35          cout << "\nThe difference between two numbers is " << result;
36      }
37      else if (letter == "c") { // third function, 'c'
38          cout << "\nThe value of sum is: " << function3(lbound, ubound);
39      }
40      else { // All invalid input ends program with terminations message
41          cout << "\nInvalid input";
42      }
43      cout << endl;
44      return 0;
45  }
46
47  // function 1: Range of number being multiples fof 2 and 7 in bound
48  int function1(int l, int u) {
49      cout << "\nList of numbers in this interval which are multiple of both 2 and 7: ";
50      while (l <= u) { // while-loop to test all values between bound
51          if (l % 2 == 0 && l % 7 == 0) { // multiples of 2 and 7 ONLY when remains of factor are zero
52              cout << l << " "; // print out result of this iteration loop
53          }
54          l++;
55      }
56      return l; // return back to function2 the results
57  }
58
59  // function 2: Difference between upper and lower bound
60  void function2(int l, int u, int &res) {
61      res = u - l; // substraction betwwen upper bound to lower bound
62  }
63
64  // function 3: Sum calculation with type double
65  double function3(double l, double u) {
66      cout << fixed << setprecision(3); // set 3 decimal places
67      double sum = 0;
68      for (double temp= l; temp<= u; temp++) { // for-loop from lower to upper bound
69          sum += 1 / temp; // equation of the sum
70      }
71      return sum; // return back to function3 the results
72  }
```

```
Microsoft Visual Studio Debug Console
Please enter two positive integer numbers (Lower bound/Upper bound): 11 63

Please enter a character (a, b or c): b

The difference between two numbers is 52

E:\vsCode\Project Location\COEN 243 Assignments\Assignment 2\Question_4\Deb
 code 0.
To automatically close the console when debugging stops, enable Tools->Opti
le when debugging stops.
Press any key to close this window . . .
```

100 % No issues found

Question 4: (part 3)



Question 4: (part 4)