Assignment #1 - Standard I/O, Math, and if/else

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ELEC2850 Microcontrollers Using C Programming

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1 Question 1

1.1

Answer is b. {}

1.2

Answer is c.

1.3

Answer is b. No.

1.4

Answer is b. A semicolon ;

1.5

Answer is c. The Screen.

2 Q2 Problem Statement

Create a program that takes a users two coordinates, formatted by x1,y1 and x2,y2, and calculates the distance between the two points. Then display that distance to the user.

3 Algorithm

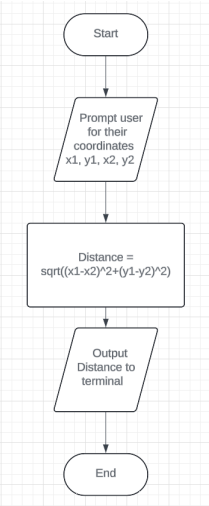

Figure 1: Flowchart for Question 2

4 Output

```
Enter your first coodinate as x1 y1: 7 12
Enter your second coodinate as x2 y2: 3 9
The distance between the two points is: 5.000000
```

Figure 2: Output for Question 2

5 Code

```c
#include <stdio.h>
#include <math.h>

void main()
{
  float x1, y1, x2, y2 = 0;                    // Declare all variables needed
  printf("Enter your first coodinate as x1 y1: ");        // prompt user for their first coordinate
  scanf("%f %f", &x1, &y1);                    // collect first coordinate in x1 and y1
  printf("Enter your second coodinate as x2 y2: ");       // prompt user for their second coordinate
  scanf("%f %f", &x2, &y2);                    // collect second coordinate in x2 and y2
  float distance = sqrt(pow(x2 - x1, 2) + pow(y2 - y1, 2));   // calculate the distance between the
    two points
  printf("The distance between the two points is: %f", distance); // print the distance between the
    two points
}
```

6 Q3 Problem Statement

Create a program that takes a users two numbers, and calculates a pythagorean triple from the two numbers. If the first number entered is smaller than the second, prompt the user to switch the two and retry.

7 Algorithm

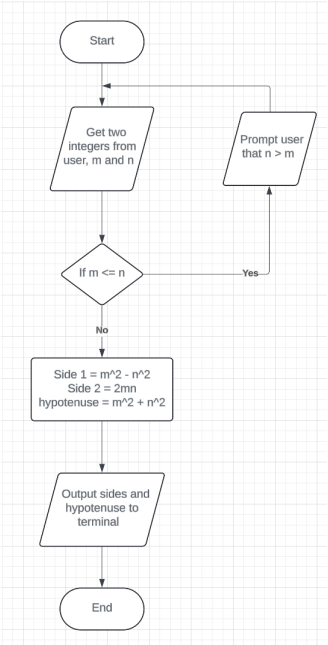

Figure 3: Flowchart for Question 3

8 Output

```
Enter two integers, where the first number is the larger side, in format num1 num2: 1 3
The first number is not the larger side. Please try again.
Enter two integers, where the first number is the larger side, in format num1 num2: 1 6
The first number is not the larger side. Please try again.
Enter two integers, where the first number is the larger side, in format num1 num2: 55 333
The first number is not the larger side. Please try again.
Enter two integers, where the first number is the larger side, in format num1 num2: 3 4
The first number is not the larger side. Please try again.
Enter two integers, where the first number is the larger side, in format num1 num2: 4 3
The sides of the triangle are: 7.000000, 24.000000, 25.000000
```

Figure 4: Valid and invalid inputs for Question 3

9 Code

```c
#include <stdio.h>
#include <math.h>

void main()
{
  float m, n = 0;                                          // declare all variables needed to store input
  printf("Enter two integers, where the first number is the larger side, in format num1 num2: "); // prompt user for input
  scanf("%f %f", &m, &n);                                  // collect num1 in m and num2 in n
  m = abs(m);                                              // convert m to positive
  n = abs(n);                                              // convert n to positive
  if (m <= n)                                              // check if m is less than or equal to n
  {
    printf("The first number is not the larger side. Please try again.\n"); // print error message and restart the program when m < n
    main();
  }
  else
  {
    float side1 = pow(m, 2) - pow(n, 2);                   // calculate the first side of the triangle
    float side2 = 2 * m * n;                               // calculate the second side of the triangle
    float hypotenuse = pow(m, 2) + pow(n, 2);              // calculate the hypotenuse of the triangle
    printf("The sides of the triangle are: %f, %f, %f", side1, side2, hypotenuse); // print the sides of the triangle
  }
}
```