

# **LAB REPORT**

## **LAB 2 SECTION C**

**SUBMITTED BY:**

**SCOTT VLASIC**

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**Problem:**

There were three problems that needed to be solved for this lab. Firstly, the program mysterious output had issues in the printf() function that was causing errors in the output. Secondly, in part 2 there were multiple cases that needed to be changed so that int and doubles would be correctly converted and displayed. Therefore, the numbers in the expressions needed to be changed so that double was performing operations on doubles and int was performing operations on ints. Finally, I had to look at the values of the esplora and how the code from lab3-3.c could be useful in interpreting the output of the esplora.

**Analysis:**

To begin this lab, I had to open the code provided for me that gave the output for Mysterious Output. I chose to do all of my code modifications in Notepad++ since it is the one I'm most familiar to. I had to modify the code given so that the printf() functions would output the proper values. So instead of an int printing a %lf I had to change it to %d and vice versa for doubles. The second problem was very similar to the Mysterious Output problem except more problems and I had to change to physical numbers instead of the printf() function. For example, if a double was trying to perform with int values I had to change them to double values that were equivalent. Finally, for the last problem I had to measure the magnitudes of the esplora at different positions and look as to why the code is useful in interpreting the magnitude values. I looked at the magnitude values of the esplora when it was at rest, moving, and being dropped from a small height. All of the code was executed in Cygwin as well.

**Design:**

To begin solving the Mysterious Output problem, I had to look at what the current code was returning and see if it was correct. The first problem wanted an int to be returned but in the printf() function, it was calling for a %lf instead of a %d which was resulting in a double value. To fix this I simply changed the %lf to a %d and the output value was changed to an int. The second part of Mysterious Output was correct as an int was desired and an int value was returned so I didn't make any changes to this. For the last part of this code, a double value was wanted but an int was being returned. Therefore, I changed the %d to a %lf so that a double would be returned.

For the second task, I was given problems a-k that either wanted a double or an int to be returned based on the values given. Therefore I had to look at the numbers on the right side of the equation and see if they were correct for the output desired. To give an example, if the problem was  $\text{int} = 6427 + 1725$ , I had to change nothing since the value being returned was an int. However, if the equation was  $\text{double} = 79 + 12/5$  I had to change the values so that  $\text{double} = 79.0 + 12.0/5.0$  and thus the output will be correctly formatted as a double instead of an int. For double values as well, I had to round to 2 decimal places so in the printf() function

had to print %.2lf so that it would be correctly rounded. So basically for the rest of the second problem I had to convert values to the correct output. The full changes can be seen in my code at the end of the report.

For the final problem, I had to take the esplora and perform three processes on it. I had to take values when the esplora was at rest, when I was moving the esplora, and when I was dropping the esplora a small distance onto my lap. The source code given computes the magnitude by taking two points (x,y,z) and (x2, y2, z2) and calculating the magnitude by taking the  $\sqrt{x^2+y^2+z^2}$ . All of this data was printed onto excel spreadsheets that could be analyzed. The magnitude equation is useful because it can tell the direction of the esplora. For example, looking at the three sets of excel data, I can tell when the esplora was at rest, when it was dropping, and when I was moving the esplora all because of the magnitude that was returned.

### **Testing:**

To test the code of the first issue, Mysterious Output, I first ran the source code that I was given to see what the issue was that was occurring. I then saw that the problems were in the printf() function so I changed them to %lf and %d respectively and tested numbers to see if the outputs were correct. I did these tests with multiple double and int values to see if it returned what I wanted each time. In the second problem, my approach was similar to the Mysterious Output problem except this time I was modifying numbers rather than the printf() function. Again, I tested the code with multiple double and int values depending on what the desired output was and modified my code based on the results. For the esplora tests, I made sure the esplora was in the correct COM slot and tested values at least twice for each test to see if they were close and that there were no discrepancies in the data collection process.

### **Comments:**

Looking at the code I wrote I feel as though I have a better understanding of double and int values as a whole. Before this lab I would be a bit confused as to why  $\text{int} = 12/5$  returned a value different than  $\text{double} = 12/5$ . I also learned more about how to properly use the esplora and how the magnitude equation could assist me in analyzing the direction it is moving at any given time. One major issue I had was worrying over whether the code I was writing was correct since many of the later parts in problem were returning the same values for me. To solve this I asked the TA if this is what the exercise wanted and they confirmed that what I was doing was correct. If I had to change anything about this lab I would change the numbers in problem 2 so that there is variation because at times it felt like I was doing the same problem over and over again.

## Implementation:

// CprE 185: Lab 3

// Problem 1: Mysterious Output

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

```
int main(){
```

```
    int integerResult;
```

```
    double decimalResult;
```

```
    // The printf was returning a %lf which is only applicable for doubles while this wants an  
    int to return
```

```
    integerResult = 77 / 5;
```

```
    printf("The value of 77/5 is %d\n", integerResult);
```

```
    // This is correct since %d applies to int
```

```
    integerResult = 2 + 3;
```

```
    printf("The vlaue of 2+3 is %d\n", integerResult);
```

```
    // The printf was returning a %d which is only applicable for int while this wants a double  
    to return
```

```
    decimalResult = 1.0 / 22.0;
```

```
    printf("The value of 1.0/22.0 is %lf\n", decimalResult);
```

```
    return 0;
```

```
}
```

// CprE 185: Lab 3

// Problem 2

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

```
int main(){
```

```
    int integerResult;
```

```
    double decimalResult;
```

```
    double areaResult;
```

```
double metersResult;  
double centigradeResult;
```

```
integerResult = 6427 + 1725;  
printf("The value of 6427+1725 is %d\n", integerResult);
```

```
integerResult = (6971 * 3925) - 25;  
printf("The value of (6971*3925)-25 is %d\n", integerResult);
```

```
decimalResult = 79.0 + 12.0/5.0;  
printf("The value of 79.0 + 12.0/5.0 is %.2lf\n", decimalResult);
```

```
decimalResult = 3640.0/107.9;  
printf("The value of 3640.0/107.9 is %.2lf\n", decimalResult);
```

```
integerResult = (22/3)*3;  
printf("The value of (22/3)*3 is %d\n", integerResult);
```

```
integerResult = 22/(3*3);  
printf("The value of 22/(3*3) is %d\n", integerResult);
```

```
decimalResult = 22.0/(3.0*3.0);  
printf("The value of 22.0/(3.0*3.0) is %.2lf\n", decimalResult);
```

```
decimalResult = 22.0/3.0 * 3.0;  
printf("The value of 22.0/3.0 * 3.0 is %.2lf\n", decimalResult);
```

```
decimalResult = (22.0/3.0) * 3.0;  
printf("The value of (22.0/3.0) * 3.0 is %.2lf\n", decimalResult);
```

```
integerResult = 22/(3*3);  
printf("The value of 22/(3*3) is %d\n", integerResult);
```

```
decimalResult = 22.0/3.0 * 3.0;  
printf("The value of 22.0/3.0 * 3.0 is %.2lf\n", decimalResult);
```

```
areaResult = 3.14 * 23.567;  
printf("The area of a circle with a circumference of 23.567 is %.2lf\n", areaResult);
```

```
    metersResult = 14.0 * 0.3048;
    printf("14 feet is %.2lf meters\n", metersResult);

    centigradeResult = (76.0-32.0)/1.8;
    printf("76 degrees Fahrenheit is %.2lf degrees Centigrade\n", centigradeResult);

    return 0;
}
```