Introduction to Programming
Practice Problems-1

Hi all. Please implement a few more basic programs in this lab related to data types, operators and if-else statement. We have not gone into details of if-else statement in our class yet. But the following syntax of if-else will help you in handling practice problems in today's lab.

```
if (expression) {
    statements_for_true_block;
} else {
    statements_for_false_block;
}
```

if the expression in the above statement evaluates to true (non-sero value) then the statements in the if block will be execued otherwise statements in the else block will be execued. You can even use nested if-else-if control statement as follows.

```
if (expression) {
    statements;
} else if (expression) {
    statements;
} else {
    statements;
}
```

Try to develop programs for the following sample problems. If you have any doubt then consult you TA's.

1. Read three real numbers x, y and z and print the value of $(x^2 * y)/z$.

   ```
   Input:
       2.1
       0.7
       0.3
   Output:
       10.29
   ```

2. Read 3 integers and print the smallest of char, short int, int or long int that will be able to hold the values. The type could be unsigned if the number is non-negative. Give preference to signed over unsigned. for example:

```
Input:
    5
    187
    4294967295
Output:
    char
    short int
    unsigned int
```

3. The root of a quadratic equation $ax^2 + bx + c = 0$ (where a, b and c are coefficients) is given by following the formula.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \tag{1}$$

Output

Enter coefficients a, b and c: 6 7 5
Roots are complex and different.
root1 = -0.583333 + 0.702179 i
root2 = -0.583333 - 0.702179 i

Link for quadratic equation

`https://en.wikipedia.org/wiki/Quadratic_equation#Quadratic_formula`

4. Write a program to implement functions of a calculator.

5. Write a program that correctly prints the shorter of the two paths, AOB and COD, where O is the origin; points A, B, C and D are successively (2, 5, 31), (1,2,9), (0, 7, 27) and (1,8,10). Use the following link for help.

`http://www.calculatorsoup.com/calculators/geometry-solids/distance-two-points.php`

For this program, you have to find the square root of a number. To do that you can use the library function **sqrt** which is defined in *math.h*. Hence, to use **sqrt** (sqrt(9) will return 3) write **# include** < *math.h* >. Also while compiling with *gcc* add $-lm$ i.e., "gcc $-lm$ yourprogram.c".

6. Write the program to find the size of all data types.

7. Write the program to find the minimum and maximum value of the integer and float.

8. Write a program to analyze and find the maximum size integer can support in your system compiler.

9. Take numbers in a range 1 to 1000. If input is 500 return "Exactly Middle". If no < 100 return "number is low". If input is 1 return "Exactly smallest".

10. Choose two integers from a set of three integers $\{a, b, c\}$. Write a program to implement the following table. i.e., if "c" and "a" is entered, you should print "a win"

no1	no2	res
a	a	tie
b	b	tie
c	c	tie
a	b	b win
b	c	b win
a	c	c win
b	a	a win
c	a	a win
c	b	c win