

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
MIN-103: Programming and Data Structures
TUTORIAL 3

Problems to be done in copy

1. Convert 23 and -55 into binary integers using two's complement approach and find the sum of the two numbers.
2. Identify whether the user defined identifiers or variables given below are valid or invalid. If the identifiers or variables are invalid, give reasons for the same.
i) no-of-students ii) no_of_students iii) 1subject iv) iitr,
v) rupees&paise vi) Float vii) int viii) x ix) y#
x) \$distance.
3. What is a MACRO in c++? Determine the usage of the following MACROS.
__LINE__, __FILE__, __DATE__, __TIME__

Problems for programming

Write flowchart/pseudo code for all the problems

1. Write a program for finding the roots of a quadratic equation
$$ax^2 + bx + c = 0$$
where a, b and c are integers to be read from the user. You have to take into account the real and imaginary roots.
2. Write a program with the macro **#define f(x) x * x - x**. Check the output of the program for the following invocation
 - a. f(x + 3) for any value of x
 - b. f(x) for any value of x
 - c. f(f(x))
3. Use __LINE__, __FILE__, __DATE__, __TIME__ macros in your program.
4. By writing a c++ code, determine the output of the following code snippet

```
#define LIMIT 5
int main()
{
    for (int i = 0; i < LIMIT; i++) {
        std::cout << i << "\n";
    }
    return 0;
}
```

5. The header file `#include<limits>` is used to determine the minimum and maximum value of a variable of type **T**, using the following statement `numeric_limits<T>::min()` and `numeric_limits<T>::max()`. Declare a variable **a** with a minimum value of float type variable and a variable **b** with a value of 1.5 times of variable **a**. Write a c++ code to check the values of **a**, **b** and **b-a**. Comment on the output.

6. By writing a c++ code, determine the output of the following code snippet

```
int main()
{
    bool x,y;
    x=5 > 7;
    y=5==7-2;
    cout<<x<< "\t" << y << endl;
    return 0;
}
```

7. By writing a c++ code, determine the output of the following code snippet

```
int main()
{
    int a =5;
    int b=5/2;
    double c = 2/3*4+int(5.4)+double(4)/2;
    cout<<b<< "\t" << double(a)/2<< "\t" << c<< endl;
    return 0;
}
```

8. Write a program to make the first letter of each word in the following sentence capital.
“welcome to indian Institute of technology Roorkee.”