CYK/2005/PH 407/**Laboratory 3**

Create new directory Lab3 in PH407. From this lab onwards, your lab work will be evaluated and graded.

1. Write a program (quadratic.c) that solves the quadratic equation

$$Ax^2 + Bx + C = 0$$

where $A, B, C \in \Re$ are given as input. The program should print complex solutions are a pair of real numbers.

2. A student in "C Programming"takes 100 marks examination and gets m marks. And he will get a letter grade according to the following rule:
If $m \geq 80$, then the grade is 'A'
If $m < 80$ AND $m \geq 60$, then the grade is 'B'
If $m < 60$ AND $m \geq 40$, then the grade is 'C'
If $m < 40$, then the grade is 'F'
Write a program (grade.c), which takes m as input and prints the grade. Assume $0 \leq m \leq 100$ is an integer.

3. Writing an `if` statement as a body of another `if` statement is allowed in C language (nested `if`). Here is an alternate program for the grading scheme mentioned in previous problem.

```
main()
{
    int marks;
    char grade;

    scanf("%d", &marks);

    if ( marks >= 80 ) grade = 'A';
    else
    {
       if ( marks >= 60 ) grade = 'B';
       else
       {
           if ( marks >= 40 ) grade = 'C';
           else grade = 'F';
       }
    }

    printf("Grade = %c\n", grade);
}
```

Study this program carefully. Type in (grade_nested_if.c) and execute.

4. Copy (using `cp`) command quadratic.c file to quadratic_improved.c. Edit quadratic_improved.c such that the program prints the case of unique solution (*ie* when $B^2 - 4AC = 0$) separately.

5. Government of India, imposes a direct tax on income. The amount of tax t depends on income i as follows:

$$t = \begin{cases} \text{nil} & \text{if} \quad i \leq 100000 \\ 0.10(i - 100000) & \text{if} \quad 100000 < i \leq 150000 \\ 5000 + 0.20(i - 150000) & \text{if} \quad 150000 \leq i \end{cases}$$

(both i and t are in units of Rs)Write a program to determine the tax if income is input. Assume income to integral. Tax is to *be rounded off* to 10 Rs.