DATE:5.11.14

**ASSIGNMENT NO.1**

->PROBLEM STATEMENT:

Write a program in C to compute the roots of a quadratic equation.

**->ALGORITHM:**

**Step 1:-** Input the coefficients of the quadratic equation,a,b,c

**Step 2:-** If a = 0 Then

Print “ This is not a quadratic equation.”

Exit

[ end of if structure]

**Step 3:-** Find the determinant *d = (b\*b)-(4\*a\*c)*

**Step 4:-** If (d > 0) Then

1. Print “The roots are real and distinct.”
2. Find the first root *x = ((-b + sqrt(d)) / 2 \* a)*
3. Find the second root *y= ((-b- sqrt(d)) /2 \* a)*
4. Print x and y.

**Step 5:-** Else if (d = 0) Then

1. Print “ The roots are equals.”
2. Find the roots *x = y = ( -b / (2 \* a))*
3. Print x and y.

**Step 6:-** Else

1. Assign *d = -d*
2. Print “The roots are imaginary.”
3. Let *s = (- b / (2 \* a))*
4. Find *m = ( sqrt(d) / 2 \* a)*
5. Now first root *x = s + im* and second root *y = s – im*
6. Print the values of x and y.

[ End of if… Then…Else if structure]

**Step 7:-** End

->CODE:

/\* ======================================\*/

/\* FIND THE ROOTS OF A QUADRATIC EQUATION\*/

# include<stdio.h>

# include<conio.h>

# include<stdlib.h>

# include<math.h>

void main()

{

   /\* Declaration of variables\*/

      int a,b,c,d;

      float r1,r2,x,r;

      clrscr();

   /\* Input co-efficients of the quadratic equation\*/

      printf("Enter co-efficients of the equation ax^2+bx+c");

      printf("\n\n\tEnter a: ");

      scanf("%d",&a);

      printf("\n\tEnter b: ");

      scanf("%d",&b);

      printf("\n\tEnter c: ");

      scanf("%d",&c);

   /\* Check whether a valid quadratic equation can be produces\*/

      if (a==0)

      {

       printf("\tCo=efficient of a is 0.So this is a trival quadratic equation.");

       r1=-c/(float)b;

       printf("\nRoot is %f",r1);

       getch();

       exit(0);

      }

      d=(b\*b)-(4\*a\*c); // d is discriminant

  /\* Find the real and unequal roots when d>0\*/

      if (d>0)

      {

      printf("\nThe roots are real and unequal");

      r1=(-b+sqrt(d))/(2 \* a);

      r2=(-b-sqrt(d))/(2 \* a);

      printf("\nFirst root is = %f",r1);

      printf("\nSecond root is = %f",r2);

      getch();

      exit(0);

      }

   /\* Find the real and equal roots when d=0\*/

      if (d==0)

      {

     printf("\nThe roots are real and equal");

     r1=(float)(-b)/(2 \* a);

     printf("\nRoot is = %f",r1);

     getch();

     exit(0);

      }

   /\* Find the complex roots when d<0\*/

      {

      printf("\nRoots are complex");

      d=-d;

      x=(float)(-b)/(2 \* a);

      r=sqrt(d)/(2 \* a);

      printf("\nFirst root is %f + %f i",x,r);

      printf("\nSecond root is %f -%f i",x,r);

      getch();

      }

}

**->OUTPUT :**

/\*==============OUTPUT==================================\*/

/\*=====First Case==>>

Enter co-efficients of the equation ax^2+bx+c

     Enter a:0

     Enter b: 5

     Enter c: 2

     Co=efficient of a is 0.So this is a trival quadratic equation.

Root is -0.400000

/\*====Second Case===>>

Enter co-efficients of the equation ax^2+bx+c

     Enter a:1

     Enter b: -6

     Enter c: 9

The roots are real and equal

Root is = 3.000000

/\*=====Third Case=====>>

Enter co-efficients of the equation ax^2+bx+c

     Enter a: 6

     Enter b: -5

     Enter c: -6

The roots are real and unequal

First root is = 1.500000

Second root is = -0.666667

/\*=====Fourth Case=====>>

Enter co-efficients of the equation ax^2+bx+c

     Enter a:1

     Enter b: 5

     Enter c: 16

Roots are complex

First root is -2.500000 + 3.122499 i

Second root is -2.500000 -3.122499 i

\*/

**->DISCUSSION:**

1. **HEADER FILES** contain definitions of functions and variables which can be incorporated into any C program by using the pre-processor *#include* statement. Standard header files are provided with each compiler, and cover a range of areas, string handling, mathematical, data conversion, printing and reading of variables. This is done at the beginning of the C source file. Some header files are :-
   1. “stdio.h”- This is standard input output. It is used for the library functions printf and scanf.
   2. “conio.h”- This is console input output.
   3. “math.h” is a header file which is used at the program when any mathematical function is used in the program. In this program we used the “sqrt()” library function for that we used “math.h”.
   4. “sqrt()” is a library function used to calculate the square root of a function.
2. **DATATYPES :**

C language is rich in its data types. Storage representations and machine instructions to handle constants differs from machine to machine. The variety of data types available the programmer to select the type appropriate to the needs of the application as well as machine. Some data types are –int, float, char, etc

3.**IF CONDITIONS:**

The if statement is a decision-making statement that is used to control the flow of the execution, based upon specified conditions. The types of if structures are:

* 1. if( condition)

{

//Statement

}

Here if condition is true then it executes the statement else it don’t execute the statements.

* 1. if( condition1)

{

//Statement1

}

Else if( condition2)

{

//Statement2

}

Else

{

//Statement3

}

Here if condition1 is true then statement1 executes, if condition2 is true, statement2 executes, otherwise statement3 executes.

1. “exit(0)” is a library function is used to terminate from the program. For this function “stdlib.h” or “process.h” header files are used.