**DEPARTMENT OF STATISTICS**

**PANJAB UNIVERSITY ,CHANDIGARH**

**Logo

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**PROJECT WORK**

**OF**

**NUMERICAL TECHNIQUES USING C**

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**/\*PROGRAM OF CALCULATOR\*/**

#include <stdio.h>

#include <conio.h>

#include <math.h>

#define F(x) ((c\*x\*x\*x)+ (d\*x\*x)+(e\*x)+(f) )

#define G(x) ((3\*x)+ sin(x)- exp(x))

#define H(x) ((cos(x)- x\*exp(x)))

#define T(x) (-(sin(x))-(x\*exp(x))-(exp(x)))

long double factorial(int n)

{

int i;

long f=1;

for(i=1;i<=n;i++)

{

f=f\*i;

}

return f ;

}

int gcd(int A, int B)

{int temp;

while((B%A)!=0)

{

temp =B%A;

B=A;

A=temp;

}

return(A);

}

int main()

{

int i=1,j,n ,o,num,number,p,q,k=0,n1,n2,n3,n4,result,fact=1,exponent;

long power=1;

float array[100],x,c,d,e,f,a,avg,s=0,var,mul=1,r, t,sd, sum1=0,D,S[20],b=0, C, sum=0,squareroot,cuberoot,modulus,X[100],Y[100],mX,mY,vX,vY,cXY,max=0,mode,sX=0,sY=0,sX2=0,sY2=0,sXY=0 ,l=1,m,y,x3,f1,f2,f3,g1,g2,g3,x0,x1,x2,g,l2,h1,l3,c2,d2,h2,h3,det,root1,root2,real,img;

hi:

printf("\n Select the mode of Calculator : ");

printf("\n Enter 1 for MATHEMATICAL Calculations");

printf("\n Enter 2 for STATISTICAL calculations ");

printf("\n Enter 3 for NUMERICAL calculations ");

printf("\n Enter your Choice : ");

scanf ("\n %d", &n);

switch(n)

{

case 1:

{

printf ( "\n You are in Mathematical mode , so " );

printf ( "\n Enter 1 for Addition ");

printf ( "\n Enter 2 for Subtraction ");

printf ( "\n Enter 3 for Multiply ");

printf ( "\n Enter 4 for Divison ");

printf ( "\n Enter 5 for Factorial ");

printf ( "\n Enter 6 for Power ");

printf ( "\n Enter 7 for Permutation and Combination ");

printf ( "\n Enter 8 for square Root ");

printf ( "\n Enter 9 for cube Root ");

printf ( "\n Enter 10 for sine ");

printf ( "\n Enter 11 for cosine ");

printf("\n Enter 12 for modulus");

printf("\n Enter 13 for gcd");

printf("\n Enter 14 for roots of a quadratic equation");

printf ( "\n Enter your choice : ");

scanf ( "\n %d",&n);

switch(n)

{

case 1:

printf ("\n How many numbers you want to add :" );

scanf ( "\n %d", &num);

printf("\n Enter the numbers you want to add : " );

for ( i=1; i<= num; i++)

{

scanf("\n %f",&array[i]);

sum = sum + array[i];

}

printf (" \n Sum of the %d numbers is %f ", num , sum);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 2:

printf("\n How many numbers you want to operate:" );

scanf("%d",&n);

printf("\n Enter first number from which you subtract numbers : ");

scanf("%f",&a);

b=0;

for(i=2;i<=n;i++)

{

printf("\n Enter %d Number :",i);

scanf("%f",&x);

b=b+x;

}

s= a-b;

printf("\n Subtraction of the given numbers : %f", s);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 3:

printf("\n How many numbers you want to Multiply : ");

scanf("%d",&n);

mul=1;

for(i=1;i<=n;i++)

{

printf("\n Enter %d number: ",i);

scanf("%f",&x);

mul= mul\*x;

}

printf("\n Multiply of given numbers is %f", mul);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if (o==1)

{

goto hi;

}

break;

case 4:

printf ("\n Enter dividend : ");

scanf("%f",&b);

printf("\n Enter divisor : ");

scanf("%f",&a);

d = b/a;

printf("\n %f/%f = %f ", b,a,d);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 5:

printf("\n Enter number to calculate its Factorial : ");

scanf("%d",&n);

for(i=1;i<= n;i++)

{

fact=fact\*i;

}

printf("Factorial of a Number is: %d",fact);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 6:

printf("\n Enter any Number : ");

scanf("%d",&n);

printf("\n Enter the Exponent value:");

scanf("%d",&exponent);

for(i=1;i<= exponent;i++)

{

power=power\*n;

}

printf("%d^%d=%ld",n,exponent,power);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 7:

printf("\n Enter the value of n = ");

scanf("%d",&n);

printf("\n Enter the value of r = ");

scanf("%d",&i);

c=n-i;

x= factorial(n);

a= factorial(i);

d= factorial(c);

C=(x)/(a\*d);

D=(x)/(d);

printf("\n %d C %d= %f",n,i,C);

printf("\n %d P %d= %f",n,i,D);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 8:

printf("Enter a positive number to find squareroot =");

scanf("%d",&number);

squareroot = pow(number,0.5);

printf("Squareroot is =%f",squareroot);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 9:

printf("Enter a positive number to find cube root =");

scanf("%d",&number);

cuberoot = pow(number,0.33334);

printf("Cube root is =%f",cuberoot);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 10:

printf("\n Enter the value of x (in degree): ");

scanf("%f",&x);

printf("\n Enter the value of n: ");

scanf("%d",&n);

x= x\*3.14159/180;

t=x;

sum=x;

for(i=1;i<=n;i++)

{

t=(t\*(-1)\*x\*x)/(2\*i\*(2\*i+1));

sum= sum+t;

}

printf(" The value of sin(%f)= %f",x,sum);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 11:

printf("\n Enter the value of x(in degree): ");

scanf("%f", &x);

printf("\n Enter the value of n: ");

scanf("%d",&n);

x=x\*3.14159/180;

t=1;

sum=1;

for(i=1;i<=n;i++)

{

t=(t\*(-1)\*x\*x)/(2\*i\*(2\*i-1));

sum = sum+t;

}

printf(" The value of cos(%f) is %f ",x,sum);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 12:

printf("Enter dividend and divisor: ");

scanf("%f%f",&y,&g);

q=y/g;

p=q\*g;

modulus=y-p;

printf("Modulus:%f\n",modulus);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 13:

printf("Enter the four numbers:");

scanf("%d%d%d%d",&n1,&n2,&n3,&n4);

result =gcd(gcd(n1,n2),gcd(n3,n4));

printf("the gcd of %d,%d,%d and %d is %d\n", n1,n2,n3,n4 ,result);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 14:

printf("\n Enter the value of coefficient a, b and c: \n ");

scanf("%f %f %f", &a, &b, &c);

det = b\* b- 4 \* a \* c;

if (det > 0)

{

root1 = (-b + sqrt(det)) / (2 \* a);

root2 = (-b - sqrt(det)) / (2 \* a);

printf("\n Value of root1 = %.2f and value of root2 = %.2f", root1, root2);

}

else if (det == 0)

{

root1 = root2 = -b / (2 \* a);

printf("\n Value of root1 = %.2f and Value of root2 = %.2f", root1, root2);

}

else {

real = -b / (2 \* a);

img = sqrt(-det) / (2 \* a);

printf("\n value of root1 = %.2f + %.2fi and value of root2 = %.2f - %.2fi ", real, img, real, img);

}

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

}

break;

case 2:

printf("\n YOU ARE IN STATISTICAL MODE ,so ");

printf("\n Enter 1 for Average ");

printf("\n Enter 2 for Variance ");

printf("\n Enter 3 for Standard Deviation ");

printf("\n Enter 4 for Range ");

printf("\n Enter 5 for correlation coefficient");

printf("\n Enter 6 for Mode");

printf("\n Enter 7 for Median");

printf("\n Enter your choice : ");

scanf("%d",&n);

switch(n)

{

case 1:

printf("\n How many numbers you want to enter :");

scanf("%d",&n);

printf("\n Enter the numbers : ");

for(i=1;i<=n;i++)

{

scanf("\n %f",&x);

sum = sum + x;

}

avg = sum/n;

printf("\n Average is %f", avg);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("\n %d",&o);

if(o==1)

{

goto hi;

}

break;

case 2:

printf(" How many numbers you want to enter : ");

scanf("%d",&n);

printf("\n Enter the Numbers : ");

for(i=1;i<=n;i++)

{

scanf("%f",&x);

sum = sum +x;

sum1 = sum1 + (x\*x);

}

avg = sum/n;

var = (sum1/n)-(avg\*avg);

printf("\n Variance is %f",var);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 3:

printf(" How many numbers you want to enter : ");

scanf("%d",&n);

printf("\n Enter the Numbers : ");

for(i=1;i<=n;i++)

{

scanf("%f",&x);

sum = sum +x;

sum1 = sum1 + (x\*x);

}

avg = sum/n;

var = (sum1/n)-(avg\*avg);

sd = sqrt(var);

printf("\n Standard Deviation is : %f", sd);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 4:

printf("\n How many numbers you want to enter : ");

scanf("%d",&n);

printf("\n Enter the numbers : ");

for(i=1;i<=n;i++)

{

scanf("%f",&C);

if(i>1)

{

if (C>a)

a=C;

else if(C<d)

d=C;

}

else

{

a=C;

d=C;

}

}

r = a-d;

printf("\n Range is %f", r);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 5:

printf("\n Enter the size of data n:");

scanf("%d",&n);

for(i=0;i<n;i++)

{

printf("\n Enter the value of X[%d] and Y[%d]=",i,i);

scanf("%f",&X[i]);

scanf("%f",&Y[i]);

sX+=X[i];

sY+=Y[i];

sX2+=X[i]\*X[i];

sY2+=Y[i]\*Y[i];

sXY+=X[i]\*Y[i];

}

mX=sX/n;mY=sY/n;

vX=sX2/n-mX\*mX;vY=sY2/n-mY\*mY;

cXY=sXY/n-mX\*mY;

r=cXY/sqrt(vX\*vY);

printf("\n Correlation Coefficient is r=%f",r);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 6:

printf("\nEnter the limit\n");

scanf("%d",&n);

printf("Enter the set of numbers\n");

for(i=0;i<n;i++)

{

scanf("%f",&X[i]);

}

for(i=0;i<n-1;i++)

{

mode=0;

for(j=i+1;j<n;j++)

{

if(X[i]==X[j])

{

mode++;

}

}

if((mode>max)&&(mode!=0))

{

k=0;

max=mode;

Y[k]=X[i];

k++;

}

else if(mode==max){

Y[k]=X[i];

k++;

}

}

for(i=0;i<n;i++){

if(X[i]==Y[i])

l++;

}

if(l==n)

printf("\n There is no mode");

else {

printf("\nMode= ");

for(i=0;i<k;i++)

printf("%f\n",Y[i]);

}

printf("\n");

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 7:

printf("How Many Number You Want to Enter:");

scanf("%d",&n );

printf("\nEnter the values:");

for(i=0;i<n;i++)

scanf("%f",&S[i]);

for(i=0;i<(n-1);i++)

{

for(j=i;j<n;j++)

{

if(S[j]<S[i])

{

b=S[j];

S[j]=S[i];

S[i]=b;

}

}

}

if(n%2==0)

{

n=n/2;

x=(S[n-1]+S[n])/2;

printf("\nMedian is:%.2f",x);

}

else

{

n=n/2;

printf("\nMedian is:%.2f",S[n]);

}

break;

}

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

}

case 3:

printf("You are in Numerical mode(want to find the roots of equation ) , so : ");

printf("\n Enter 1 for bisection method : ");

printf("\n Enter 2 for secant method :");

printf("\n Enter 3 for newton raphson method : ");

printf("\n Enter 4 for Mullar method");

printf("\n Enter your choice ");

scanf("\n %d",&p);

switch(p)

{

case 1:

printf("\n Enter 1 if want to find roots of algebraic equation : ");

printf("\n Enter 2 if want to find the roots of transcendental equation: ");

printf("\n Enter your choice : ");

scanf("%d",&n);

switch(n)

{

case 1:

printf("\n The equation F(x)= c\*x\*x\*x + d\*x\*x + e\*x+ f ");

printf("\n Enter the value of c,d,e ,f : ");

scanf("\n %f%f%f%f",&c,&d,&e,&f);

do

{

printf("\n Enter Initial appoximations :");

scanf("%f%f",&a,&b);

}

while((F(a)\*F(b))>0.0);

printf("\nStep\t\ta\t\tb\t\tm\t\t(F(m)\*F(a))\n");

do

{

m= (a+b)/2;

printf("\n%d\t\t%f\t%f\t%f\t%f",i,a,b,m,(F(m)\*F(a)));

i=i+1;

y= F(m)\*F(a);

if(y<0)

b=m;

else

a=m;}

while(fabs(F(m))>= 0.001);

printf("\n Approximate root of equation is = %f ",m);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 2:

printf("\n For which equation you want to find out the roots : ");

printf("\n Enter 1 for equation 3x+sin(x)-exp(x) ");

printf("\n Enter 2 for equation cos(x)- xexp(x)");

printf("\n Enter your choice : ");

scanf("%d",&n);

switch(n)

{

case 1:

printf("\n The Equation is 3x+sin(x)-exp(x) ");

do

{

printf("\n Enter initial approximations : ");

scanf("%f%f",&a,&b);

}while((G(a)\*G(b))>0.0);

printf("\nStep\t\ta\t\tb\t\tm\t\t(F(m)\*F(a))\n");

do

{

m = (a+b)/2;

printf("\n%d\t\t%f\t%f\t%f\t%f",i,a,b,m,(G(m)\*G(a)));

i=i+1;

y= G(m)\*G(a);

if(y<0)

b=m;

else

a=m;

} while((fabs(G(m)))>= 0.001);

printf("\n Approximate root of equation is = %f ",m);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 2:

printf("\n The Equation is cos(x)- x\*exp(x) ");

do

{

printf("\n Enter initial approximations : ");

scanf("%f%f",&a,&b);

}while((H(a)\*H(b))>0.0);

printf("\nStep\t\ta\t\tb\t\tm\t\t(H(m)\*H(a))\n");

do

{

m = (a+b)/2;

printf("\n%d\t\t%f\t%f\t%f\t%f",i,a,b,m,(H(m)\*H(a)));

i=i+1;

y= H(m)\*H(a);

if(y<0)

b=m;

else

a=m;

} while((fabs(H(m)))>= 0.001);

printf("\n Approximate root of equation is = %f ",m);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

break;}}

break;

case 2:

printf("\n Enter 1 if want to find roots of algebraic equation : ");

printf("\n Enter 2 if want to find the roots of transcendental equation: ");

printf("\n Enter your choice : ");

scanf("%d",&n);

switch(n)

{

case 1:

printf("\n The equation F(x)= c\*x\*x\*x + d\*x\*x + e\*x+ f ");

printf("\n Enter the value of c,d,e ,f : ");

scanf("\n %f%f%f%f",&c,&d,&e,&f);

do

{

printf("\n Enter Initial appoximations :");

scanf("%f%f",&a,&b);

}

while((F(a)\*F(b))>0.0);

printf("\nStep\t\tx1\t\tx2\t\tx3\t\tf3\n");

do

{

f1= F(a);

f2=F(b);

x3= (f2\*a-f1\*b)/(f2-f1);

f3=F(x3);

printf("\n%d\t\t%f\t%f\t%f\t%f",i,a,b,x3,f3);

a=b;

b=x3;

i=i+1;

}

while(fabs(f2)>= 0.001);

printf("\n Approximate root of equation is = %f ",x3);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 2:

printf("\n For which equation you want to find out the roots : ");

printf("\n Enter 1 for equation 3x+sin(x)-exp(x) ");

printf("\n Enter 2 for equation cos(x)- xexp(x)");

printf("\n enter your choice : ");

scanf("%d",&n);

switch(n)

{

case 1:

printf("\n The Equation is 3x+sin(x)-exp(x) ");

do

{

printf("\n Enter initial approximations : ");

scanf("%f%f",&a,&b);

}while((G(a)\*G(b))>0.0);

printf("\nStep\t\ta\t\tb\t\tx3\t\tg3\n");

do

{

g1=G(a);

g2=G(b);

x3=(g2\*a-g1\*b)/(g2-g1);

g3=G(x3);

printf("\n%d\t\t%f\t%f\t%f\t%f",i,a,b,x3,g3);

a=b;

b=x3;

i=i+1;

} while((fabs(g2))>= 0.001);

printf("\n Approximate root of equation is = %f ",x3);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 2:

printf("\n The Equation is Cos(x)-x\*exp(x) ");

do

{

printf("\n Enter initial approximations : ");

scanf("%f%f",&a,&b);

}while((H(a)\*H(b))>0.0);

printf("\nStep\t\ta\t\tb\t\tx3\t\th3\n");

do

{

h1=H(a);

h2=H(b);

x3=(h2\*a-h1\*b)/(h2-h1);

h3=H(x3);

printf("\n%d\t\t%f\t%f\t%f\t%f",i,a,b,x3,h3);

a=b;

b=x3;

i=i+1;

} while((fabs(h2))>= 0.001);

printf("\n Approximate root of equation is = %f ",x3);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

break;}

}break;

case 3:

{

printf("\n Enter Initial Approximations: ");

scanf("%f",&x0);

printf("\n step\t|x0\t\t|x1\t\t|H(x0)\t\t|H(x1)");

do

{

x1 = (x0 - (H(x0)/T(x0)));

printf("\n %d\t|%f\t|%f\t|%f\t|%f", i,x0,x1,H(x0),H(x1));

x0=x1;

i++;

}while((fabs(H(x1)))>0.0001);

printf(" \n\n Root is %f",x1);

}

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 4:

printf("\n Enter 1 if want to find roots of algebraic equation : ");

printf("\n Enter 2 if want to find the roots of transcendental equation: ");

printf("\n Enter your choice : ");

scanf("%d",&n);

switch(n)

{

case 1:

printf("\n The equation F(x)= c\*x\*x\*x + d\*x\*x + e\*x+ f ");

printf("\n Enter the value of c,d,e ,f : ");

scanf("\n %f%f%f%f",&c,&d,&e,&f);

printf("\n value of first three initial approximations=");

scanf("%f%f%f",&x0,&x1,&x2);

printf("\n value of error tolerence=");

scanf("%f",&g);

printf("\ni\tx0\t\tx1\t\tx2\t\tx3\t\terror");

do

{

h2=x2-x1;

h1=x1-x0;

l2=h2/h1;

d2=1+l2;

c2=l2\*((l2\*F(x0))-(d2\*F(x1))+F(x2));

g2=(l2\*l2\*F(x0))-(d2\*d2\*F(x1))+(l2+d2)\*F(x2);

if(g2<=0)

{

l3=(-2\*d2\*F(x2))/(g2-(sqrt((g2\*g2)-4\*d2\*c2\*F(x2))));

}

else

{

l3=(-2\*d2\*F(x2))/(g2+(sqrt((g2\*g2)-4\*d2\*c2\*F(x2))));

}

x3=x2+(x2-x1)\*l3;

printf("\n%d\t%f\t%f\t%f\t%f\t%f",i,x0,x1,x2,x3,fabs(F(x3)));

x0=x1;

x1=x2;

x2=x3;

i++;

}while(fabs((F(x3)))>g);

printf("\n approximate root of equation is = %lf",x3);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 2:

printf("\n For which equation you want to find out the roots : ");

printf("\n Enter 1 for equation 3x+sin(x)-exp(x)");

printf("\n Enter 2 for equation cos(x)-xexp(x)");

printf("\n Enter your choice : ");

scanf("%d",&n);

switch(n)

{

case 1:

printf("\n The Equation is 3x+sin(x)-exp(x) ");

printf("\n value of first three initial approximations=");

scanf("%f%f%f",&x0,&x1,&x2);

printf("\n value of error tolerence=");

scanf("%f",&g);

printf("\ni\tx0\t\tx1\t\tx2\t\tx3\t\terror");

do

{

h2=x2-x1;

h1=x1-x0;

l2=h2/h1;

d2=1+l2;

c2=l2\*((l2\*G(x0))-(d2\*G(x1))+G(x2));

g2=(l2\*l2\*G(x0))-(d2\*d2\*G(x1))+(l2+d2)\*G(x2);

if(g2<=0)

{

l3=(-2\*d2\*G(x2))/(g2-(sqrt((g2\*g2)-4\*d2\*c2\*G(x2))));

}

else

{

l3=(-2\*d2\*G(x2))/(g2+(sqrt((g2\*g2)-4\*d2\*c2\*G(x2))));

}

x3=x2+(x2-x1)\*l3;

printf("\n%d\t%f\t%f\t%f\t%f\t%f",i,x0,x1,x2,x3,fabs(G(x3)));

x0=x1;

x1=x2;

x2=x3;

i++;

}while(fabs((G(x3)))>g);

printf("\n approximate root of equation is = %lf",x3);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

case 2:

printf("\n The Equation is cos(x)-x\*exp(x) ");

printf("\n value of first three initial approximations=");

scanf("%f%f%f",&x0,&x1,&x2);

printf("\n value of error tolerence=");

scanf("%f",&g);

printf("\ni\tx0\t\tx1\t\tx2\t\tx3\t\terror");

do

{

h2=x2-x1;

h1=x1-x0;

l2=h2/h1;

d2=1+l2;

c2=l2\*((l2\*H(x0))-(d2\*H(x1))+H(x2));

g2=(l2\*l2\*H(x0))-(d2\*d2\*H(x1))+(l2+d2)\*H(x2);

if(g2<=0)

{

l3=(-2\*d2\*H(x2))/(g2-(sqrt((g2\*g2)-4\*d2\*c2\*H(x2))));

}

else

{

l3=(-2\*d2\*H(x2))/(g2+(sqrt((g2\*g2)-4\*d2\*c2\*H(x2))));

}

x3=x2+(x2-x1)\*l3;

printf("\n%d\t%f\t%f\t%f\t%f\t%f",i,x0,x1,x2,x3,fabs(H(x3)));

x0=x1;

x1=x2;

x2=x3;

i++;

}while(fabs((H(x3)))>g);

printf("\n approximate root of equation is = %lf",x3);

printf("\n\n Want to Restart?? If yes then press 1 otherwise any other number \n ");

scanf("%d",&o);

if(o==1)

{

goto hi;

}

break;

}

}}}}