الرحيم بسم الله الرحمن



خوارزميات في التحليل العددي مكتوبة بلغة السي بلس بلس

إعداد/بشير عبده فارع محمد العبسي

هذا الكتاب اهدأ إلى كل طلاب سوا في داخل جامعة تعز أو خارجها أو حتى من خارج هذا البلد الطيب اتمنا إلى الجميع التوفيق والنجاح . يحوي هذا الكتاب خوارزميات التالية (bi-secti \_ f-p\_ gauss\_ gramer \_ guass siedel method\_ jaccobi methoh)

لمراسلة أو الاستفسار

الجمهويه اليمنية

تعز

basheer2010.55@gmail.com

BI-SECTI-Notepad:

#include"iostream.h"

#include"conio.h"

#include"math.h"

#include"iomanip.h"

const int TOL=0.00001;

float f(float x){return x\*x\*x-x-1;};

void main()

{

clrscr();

float a,b,i,c;

int max;

cout<<"\n\n ENTER THE a: ";

cin>>a;

cout<<"\n\n ENTER THE b: ";

cin>>b;

cout<<"\n\n PLEASE ENTER THE MAX OF ITERATION: ";

cin>>max;

i=1;

if((f(a)\*f(b))<0)

{

cout<<"\n\n i\t\t c[i]\t\t f(ci)\n";

while(i<=max)

{

c=(a+b)/2;

if(abs(f(c))<=TOL)

cout<<"\n"<<i<<setw(14)<<c<<setw(20)<<f(c);

if(f(a)\*f(c)<0)

b=c;

else

a=c;

i++;

}

if(i>max)

cout<<"\n\tprocedures completed successful";

}

else

cout<<"\n\tprocedures completed un\_successful";

getch();

}

F-P:

#include"iostream.h"

#include<stdlib.h>

#include<iomanip.h>

#include<conio.h>

#include<math.h>

double f(double);

void main()

{

clrscr();

float x0,xi;

int no,i;

/\* FIXED POINT METHOD FIND f(x)= cos(x)-x \*/

cout<<"\n\n PLEASE ENTER THE INITIAL VALUE: ";

cout<<"x0= ";

cin>>x0;

cout<<"\n\n PLEASE ENTER THE NUMBRE OF ITERATIONS: ";

cout<<"no= ";

cin>>no;

cout<<"====================================================";

cout<<"\n"<<setw(16)<<"no"<<setw(14)<<"xi"<<setw(14)<<"f(xi)"<<"\n";

cout<<"====================================================\n";

i=1;

while(i<=no)

{

xi=cos(x0);

if (fabs(f(xi))<=0.00001)

{

cout<<"\n\n\t PROGRAM COMPLETE SUCCESSFULY ";

getch();

exit(1);

}

cout<<setw(16)<<i<<setw(16)<<x0<<setw(16)<<f(x0)<<endl;

i++;

x0=xi;

}

cout<<"\n\n\t PROCEDURE COMPLETED UN\_SUCCESSFULY";

getch();

}

GAUSS-Notepad:

#include"iostream.h"

#include"conio.h"

#include"math.h"

#include"iomanip.h"

const int TOL=0.00001;

float f(float x){return x\*x\*x-x-1;};

void main()

{

clrscr();

float a,b,i,c;

int max;

cout<<"\n\n ENTER THE a: ";

cin>>a;

cout<<"\n\n ENTER THE b: ";

cin>>b;

cout<<"\n\n PLEASE ENTER THE MAX OF ITERATION: ";

cin>>max;

i=1;

if((f(a)\*f(b))<0)

{

cout<<"\n\n i\t\t c[i]\t\t f(ci)\n";

while(i<=max)

{

c=(a+b)/2;

if(abs(f(c))<=TOL)

cout<<"\n"<<i<<setw(14)<<c<<setw(20)<<f(c);

if(f(a)\*f(c)<0)

b=c;

else

a=c;

i++;

}

if(i>max)

cout<<"\n\tprocedures completed successful";

}

else

cout<<"\n\tprocedures completed un\_successful";

getch();

}

GRAMER-Notepad:

#include<iostream.h>

#include<conio.h>

double delta(double a[][3])

{

double dd;

dd=a[0][0]\*(a[1][1]\*a[2][2] -a[1][2]\*a[2][1])-a[0][1]\*(a[1][0]\*a[2][2]-a[1][2]\*a[2][0])+a[0][2]\*(a[1][0]\*a[2][1] -a[1][1]\*a[2][0]);

return dd;

}

void main()

{

clrscr();

double a1[3][3],a[3][3],b[3],d[3],x[3];

double da,dx,dy,dz,i,j;

cout<<"\n\n\n\t\t ENTER COEFFICIENT OF a (3 X 3) :\n\t\t\t";

for(i=0;i<3;i++)

{

for(j=0;j<3;j++)

{

cin>>a[i][j];

a1[i][j]=a[i][j];

}

cout<<"\t\t\t";

}

cout<<"\n\t\t ENTER THE CONTANTS OF b (1 X 3) :\n\t\t\t";

for(i=0;i<3;i++)

cin>>b[i];

da=delta(a);

for(i=0;i<3;i++)

a1[i][0]=b[i]; // CALCUTION OF DELTA X

d[0]=delta(a1);

for(i=0;i<3;i++)

for(j=0;j<3;j++)

a1[i][j]=a[i][j];

for(i=0;i<3;i++)

a1[i][1]=b[i]; // CALCUTION OF DELTA Y

d[1]=delta(a1);

for(i=0;i<3;i++)

for(j=0;j<3;j++)

a1[i][j]=a[i][j];

for(i=0;i<3;i++)

a1[i][2]=b[i]; // CALCUTION OF DELTA Z

d[2]=delta(a1);

cout<<"\n\n\t\t THE DELTA DX = "<<da<<"\n\n";

for(i=0;i<3;i++)

cout<<"\t\t d["<<i<<"]= "<<d[i]<<"\n\n";

for(i=0;i<3;i++)

{

x[i]=d[i]/da;

cout<<"\t\t x["<<i<<"]= "<<x[i]<<"\n\n";

}

getch();

}

guass siedel method- Notepad:

#include <cstdlib>

#include <iostream>

#include<iostream.h>

#include<conio.h>

#include<math.h>

#include<iomanip.h>

using namespace std;

int main(int argc, char \*argv[])

{

clrscr();

cout<<"\n\n\n\n\t\t\t Guass Siedel Method \n"

<<"\n\t The linear systems are :- \n\n\n"

<<"\t 10x1 - 2x2 - x3 - x4 = 3\n"

<<"\t -2x1 + 10x2 - x3 - x4 = 15\n"

<<"\t -x1 - x2 + 10x3 - 2x4 = 27\n"

<<"\n\n\t Number of iteration = 15 , TOL=0.00001\n\n" ;

double x[4],sum[4],x0[4]={0},d=0.00001,t,s[4];

int k=1,max=6,j,i;

double a[4][4]={10,-2,-1,-1,

-2,10,-1,-1,

-1,-1,10,-2,

-1,-1,-2,10},

b[4]={3,15,27,-9};

cout<<setw(5)<<"i"<<setw(15)<<"x1"<<setw(15)<<"x2"<<setw(15)<<"x3"<<setw(15)<<"x4\n"

<<"

"<<"\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\n";

while(k<=max) {

t=0;

for(i=0;i<4;i++){

sum[i]=s[i]=0;

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

s[i]+=a[i][j]\*x[j];

for(j=i+1;j<3;j++)

sum[i]+=a[i][j]\*x0[j];

x[i]=(b[i]-sum[i]-s[i])/a[i][i];

cout.precision(4);

s[i]=pow(x[i]-x0[i],2);

t+=s[i];

}

cout<<setw(5)<<k<<setw(15)<<x[0]<<setw(15)

<<x[1]<<setw(15)<<x[2]<<setw(15)<<x[3]<<"\n";

if(sqrt(t)<d) {

cout<<" OUTPUT :- \n ";

cout<<setw(5)<<k<<setw(15)<<x[0]<<setw(15)<<x[1]

<<setw(15)<<x[2]<<setw(15)<<x[3]<<"\n"

<<"\t\t Completed successfully ...";

getch();

return;

}

k++;

for(i=0;i<3;i++) x0[i]=x[i];

}

cout<<"\n\n\t\t Procedures completed successfully ...";

getch();}

system("PAUSE");

return EXIT\_SUCCESS;

}

JAC1-Notepad:

#include<iostream.h>

#include<stdlib.h>

#include<conio.h>

#include<math.h>

#include<iomanip.h>

void main()

{

clrscr();

int n,no,j,i,k;

double a[20][20],b[20];

cout<<"\t\t\*\*\* JACCOBI METHOD \*\*\* \n" ;

cout<<"enter the number of equations: " ;

cin>>n;

cout<<"\n enter the Number of iteration: no= ";

cin>>no;

double x[20][20],sum[20];

cout<<"enter the coefficientes of x:\n ";

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

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

cin>>a[i][j];

cout<<"\n enter the coefficientes of b: ";

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

cin>>b[i];

cout<<"enter the intial values: ";

cin>>x[0][0]>>x[1][0]>>x[2][0];

cout<<"\n"<<setw(5)<<"k"<<setw(5)<<"i"<<setw(10)<<"xn"<<"\n";

k=1;

while(k<=no) //for(k=1;k<no;k++)

{

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

{

sum[i]=0;

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

if(i!=j)

sum[i]+=a[i][j]\*x[j][k-1];

}

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

x[i][k]=(b[i]-sum[i])/a[i][i];

// cout<<"============================================================\n";

if(fabs(x[i][k]-x[i][k-1])<=0.00001)

{

cout<<"\n procedure compelete successfuly";

getch();

exit(1);

}

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

cout<<setw(5)<<k<<setw(5)<<i<<setw(15)<<"x["<<i<<"]="<<x[i][k]<<"\n";

//x[i][k-1]=x[i][k];

k++;

}

cout<<"\n procedure un\_successfully \n";

getch();

}

jaccobi methoh-notepad:

#include <cstdlib>

#include <iostream>

#include<conio.h>

#include<math.h>

#include<iomanip.h>

using namespace std;

int main(int argc, char \*argv[])

{

clrscr();

cout<<"\n\n\t\t\t\*\*\* JACCOBI METHOD \*\*\*\n\n\n"

<<"\t\t FUNCTIONS ARE :- \n"

<<"\t\t 10x1 - x2 + 2x3 -x4 = 3\n"

<<"\t\t -x1 + 11x2 - x3 + 3x4 = 25\n"

<<"\t\t 2x1 - x2 + 10x3 - x4 = -11\n"

<<"\t\t Number of iteration = 19 ; TOL=0.000001\n\n\n\n" ;

double x[4],sum[4],x0[4]={0},d=0.00001,t;

int k=1,m=30,j,i;

double a[4][4]={10,-2,-1,-1,

-2,10,-1,-1,

-1,-1,10,-2,

-1,-1,-2,10},

b[4]={3,15,27,-9};

cout<<setw(5)<<"i"<<setw(15)<<"x1"<<setw(15)<<"x2"<<setw(15)<<"x3"<<setw(15)<<"x4\n"

<<" \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\n";

while(k<=m)

{

for(i=0;i<4;i++)

{

sum[i]=0;

for(j=0;j<3;j++)

if(i!=j)

sum[i]+=a[i][j]\*x0[j];

}

t=0;

for(i=0;i<4;i++)

{

x[i]=(b[i]-sum[i])/a[i][i];

sum[i]=pow(x[i]-x0[i],2);

t+=sum[i];

}

cout<<setw(5)<<k<<setw(15)<<x[0]<<setw(15)

<<x[1]<<setw(15)<<x[2]<<setw(15)<<x[3]<<"\n";

if(sqrt(t)<d) {

//cout<<"\t\t OUTPUT :- \n ";

cout<<setw(5)<<k<<setw(15)<<x[0]<<setw(15)<<x[1]

<<setw(15)<<x[2]<<setw(15)<<x[3]<<"\n"

<<"\t\t Complete successfully ...";

getch();return; }

k++;

for(i=0;i<3;i++) x0[i]=x[i];

}

cout<<"\n Procedure isn't successfully \n";

getch();

}

system("PAUSE");

return EXIT\_SUCCESS;

}

مع تحيات :

بشير عبده فارع محمد العبسي

اليمن

تعز

713243206

*basheer2010.55@gmail.com*