الرحيم بسم الله الرحمن



خوارزميات في التحليل العددي مكتوبة بلغة السي بلس بلس

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 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

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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;

}

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