**4 лаба(Гаусс 3)**

#include <iostream.h>

#include <iomanip.h>

#include <math.h>

#include <stdio.h>

#include <stdlib.h>

double X[100],Y[100],dY[100],DY[100],d2Y[100],D2Y[100],pog1[100],pog2[100],h,I;

int i,a,b,k,r,v,m;

double f(double x)

{

 double t;

 t=pow(x,2)+5\*cos(x);

 return(t);

}

double Gauss3(double A,double B,double M)

{

 double h,x0,x1,x2,s=0,integral;

 int i;

h=(B-A)/M;

x0=A+h/2;

x1=x0-(h/2)\*0.7745966692;

x2=x0+(h/2)\*0.7745966692;

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

{

 s+=0.555555555555556\*f(x1)+0.888888888888889\*f(x0)+0.555555555555556\*f(x2);

 x0=x0+h;

 x1=x0-(h/2)\*0.7745966692;

 x2=x0+(h/2)\*0.7745966692;

}

integral=(h/2)\*s;

 return (integral);

}

void main(void)

{

cout<<"a=";

cin>>a;

cout<<"b=";

cin>>b;

 cout<<"Vibirete shag:\n"<<"1 h=0.2\n"<<"2 h=0.1\n"<<"3 h=0.05\n";

 cin>>r;

 switch(r)

 {

 case 1:

 h=0.2;

 break;

 case 2:

 h=0.1;

 break;

 case 3:

 h=0.05;

 break;

 default:

 cout<<"Vibrano ne dopustimoe zna4enie";

 }

 cout<<"Viberete m:\n1 m=10\n2 m=20\n3 m=40\n";

 cin>>v;

 switch(v)

 {

 case 1:

 m=10;

 break;

 case 2:

 m=20;

 break;

 case 3:

 m=40;

 break;

 default:

 cout<<"Vibrano ne dopustimoe zna4enie";

 }

k=(b-a)/h;

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

{

 X[i]=a+(i-1)\*h;

 Y[i]=f(X[i]);

}

//первая производная

dY[1]=-(3\*Y[1]-4\*Y[2]+Y[3])/(2\*h);

dY[k+1]=(Y[k-1]-4\*Y[k]+3\*Y[k+1])/(2\*h);

for(i=2;i<=k;i++) dY[i]=(Y[i+1]-Y[i-1])/(2\*h);

for(i=1;i<=k+1;i++) DY[i]=2\*X[i]-5\*sin(X[i]);

//вторая производная

for(i=1;i<=k+1;i++) D2Y[i]=2-5\*cos(X[i]);

for(i=2;i<=k;i++) d2Y[i]=(Y[i-1]-2\*Y[i]+Y[i+1])/(h\*h);

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

{

 pog1[i]=fabs(fabs(dY[i])-fabs(DY[i]));

 pog2[i]=fabs(fabs(d2Y[i])-fabs(D2Y[i]));

}

 printf("X\tY\tdY\tDY\tpogr\td2Y\tD2Y\tpogr\n");

for(i=1;i<=k+1;i++) printf("%2.1f\t%4.3f\t%4.3f\t%4.3f\t%5.4f\t%4.3f\t%4.3f\t%5.4f\n",X[i],Y[i],dY[i],DY[i],pog1[i],d2Y[i],D2Y[i],pog2[i]);

I=Gauss3(a,b,m);

cout<<endl<<"Integral="<<I<<endl;

}