Program -2a

Divyashree h b

Source Code:

#include<iostream>

#include<vector>

#include <math.h>//exp

#include<iomanip>//precission

using namespace std;

double fun\_x(double x) {

cout << fixed;

std::setprecision(6);

return exp(x\*x);

}

int main() {

cout << "Divyashree H B" << endl;

cout << "Newtons differential differance" << endl;

int mov=1;//exit

double x, y;//intervals

char testf;//testcase for N and Y

int datapt;

while (mov==1)

{

cout << "Enter N to give functional values else enter Y" << endl;

cin >> testf;

cout << "Enter the intervals " << endl;

cin >> x >> y;

//cout << x << y<<endl;

cout << "Enter the number of data points" << endl;

cin >> datapt;

//calculate data point values and save in fun array i.e x value array

vector<double> fun(datapt);

cout <<fixed;

std::setprecision(6);

double tempsu= (y - x) / (datapt-1);

fun[0]=(x);

for (int i = 1; i <datapt; i++)

{

fun[i] = fun[i - 1] + tempsu;

//cout << fun[i] << endl;

}

//cout <<"datapoint"<< fun[0] << endl;

vector<vector< double>> funval(datapt,vector<double>(datapt)); //f(x) value array

if (testf == 'N' || testf == 'n')

{

cout << "Enter the values :" << endl;

double tempin;

for (int i = 0; i <datapt; i++)

{

cin >> tempin;

funval[i][0]=( tempin);

}

}

else

{

double temp;

for (int i = 0; i <datapt; i++)

{

temp = fun\_x(fun[i]);

//cout << "y0\t" << temp<<endl;

funval[i][0] = temp;

}

}

// fun vector holds all data points in the given interval

//funval[i][] in i all the initial f(x) or functional values are found

//starting with iteration

for (int i = 1; i < datapt;i++) {

for (int j = 0; j < (datapt - i); j++) {

//cout << i << " " << j << " " << funval[i - 1][j + 1] << " " << funval[i - 1][j] << " " << endl;

funval[j][i] = ((funval[j+ 1][i - 1] ) - (funval[j][i-1])) / (fun[j + i] - fun[j]);

}//for (int i = 0; i < tempfun.size(); i++)cout << tempfun[i] << "tempfun" << endl;

}

cout << "Differantial Table :" << endl;

//// printing the elements

for (int i = 0; i<datapt; i++)

{

cout << fun[i] << " ";

for (int j = 0; j < (datapt - i); j++) {

cout << funval[i][j] << " ";

}

cout << endl;

}

double X;

cout<<"\n"<< "Enter the value of X:" << endl;

cin >> X;

//calculating P(X) for a given X

//double prod\_x=1;//(x-xi)

double sumval=funval[0][funval[0].size()-1];//p(x)

for (int i = funval[0].size()-2;i>=0; i--)

{

sumval = funval[0][i] + (X-fun[i])\*sumval;

}

cout << "P("<<X<<") = " << sumval<<endl;

//condition to quiet

cout << endl;

cout << "To continue enter 1 else enter 0" << endl;

cin >> mov;

}

return 0;}

Screen shot: