**LAGRANGIAN INTERPOLATION**

**AND**

**INVERSE INTERPOLATION METHOD**

**PROGRAM:**

**/\*lagrange interpolation \*/**

**#include<stdio.h>**

**#include<conio.h>**

**#include<math.h>**

**void main()**

**{**

**FILE \*fin,\*fout;**

**float x[10],y[10],sum1,mul,a;**

**int i,j,n;**

**clrscr();**

**fin=fopen("p1.in","r");**

**fout=fopen("p1.out","w");**

**printf("\n enter the value of n:");**

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

**/\* loop for read the value of x[i] & y[i] \*/**

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

**{**

**fscanf(fin,"%f %f",&x[i],&y[i]);**

**printf("\n%f,%f\n",x[i],y[i]);**

**}**

**/\*loop end\*/**

**/\*statement for find a interpolation value for given point\*/**

**printf("\n enter the value of a:");**

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

**/\*calculation part \*/**

**sum1=0;**

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

**{**

**mul=1;**

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

**{**

**if(i!=j)**

**{**

**mul=mul\*((a-x[j])/(x[i]-x[j]));**

**}**

**}**

**sum1=sum1+(mul\*y[i]);**

**}**

**printf("\n when a=%f value of y=%f",a,sum1);**

**fprintf(fout,"\n when a=%f value of y=%f",a,sum1);**

**getch();**

**}**

**EXAMPLE 1: TABLE GIVES SOME RELATION BETWEEN STEAM PRESSURES**

**AND TEMPERATURES. FIND THE PRESSURE AT TEMPERATURE**

**372.1 K**

**INPUT**

**361 154.9**

**367 167.0**

**378 191.0**

**387 212.5**

**399 244.2**

**OUTPUT**

**when a=372.100006 value of y=177.830414**

**EXAMPLE 2: FORM THE DATA IN THE FOLLOWING TABLE FIND THE VALUE**

**Y WHEN X=102.0**

**INPUT**

**93.0 11.38**

**96.2 12.80**

**100.0 14.70**

**104.2 17.07**

**108.7 19.91**

**OUTPUT**

**when a=102.000000 value of y=15.793629**

**EXAMPLE 3: FROM THE DATA GIVEN BELOW FOR THE BINDING ENERGY**

**FOR ATOMIC NUMBER OF NUCLIE FIND THE BINDING ENERGY**

**FOR Cu64.**

**INPUT**

**22 8.000**

**27 8.315**

**40 8.495**

**52 8.732**

**59 8.740**

**70 8.750**

**80 8.745**

**91 8.651**

**OUPUT**

**when a=64.000000 value of y=8.731679**

**EXAMPLE 4: GIVEN THE VALUE OF X AND Y IN THE FOLLOWING TABLE**

**FIND THE VALUE OF Y FOR X=5.60275.**

**INPUT**

**5.600 0.77556588**

**5.602 0.77682686**

**5.605 0.77871250**

**5.607 0.77996571**

**5.608 0.78059114**

**OUTPUT**

**when a=5.602750 value of y=0.777299**

**EXAMPLE 5: THR ACCELERATION DUE TO GRAVITY AT AN ALTITUDE Y**

**ABOUT THE SURFACE OF EARTH IS GIVEN BY THE FOLLOWING**

**TABLE. FIND THE VALUE OF g AT 55000.0 m.**

**INPUT**

**0 9.8100**

**20000 9.7487**

**40000 9.6879**

**60000 9.6278**

**80000 9.5682**

**OUTPUT**

**when a=55000.000000 value of y=9.642763**

**EXAMPLE 6: THE EXPERIMENT IS PERFORMED TO DETERMINE THE**

**PERCENTAGE ELONGATION OF A MATERIAL AS THE**

**FUNCTION OF TEMPERATURE. THE RESULTING DATA**

**IS GIVEN IN THE TABLE. PREDICT THE % ELONGATION**

**AT 780 F.**

**INPUT**

**400 11.0**

**500 13.0**

**600 13.0**

**700 15.0**

**800 17.0**

**900 19.0**

**1000 20.0**

**1100 25.0**

**OUTPUT**

**when a=780.000000 value of y=16.603424**

**EXAMPLE 7: WRITE C PROGRAM FOR LAGARNGES METHOD OF**

**INTERPOLATION AND CALCULATE THE PERIODE OF SATURN.**

**GIVEN THAT IT’S DISTANCE FROM SUN IS 9.52 AU.**

**INPUT**

**0.39 87.97**

**0.72 224.70**

**1.00 365.30**

**1.52 687.00**

**5.20 4332.458**

**19.18 30692.506**

**30.07 60201.440**

**OUTPUT**

**when a=9.520000 value of y=6293.119629**

**INVERSE INTERPOLATION**

**EXAMPLE 8: FROM THE DATA IN THE FOLLOWING TABLE FIND THE VALUE**

**OF X WHEN Y=13.5.**

**PROGRAM**

**/\*lagrange interpolation \*/**

**#include<stdio.h>**

**#include<conio.h>**

**#include<math.h>**

**void main()**

**{**

**FILE \*fin,\*fout;**

**float x[10],y[10],sum1,mul,a;**

**int i,j,n;**

**clrscr();**

**fin=fopen("p1.in","r");**

**fout=fopen("p1.out","w");**

**printf("\n enter the value of n:");**

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

**/\* loop for read the value of x[i] & y[i] \*/**

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

**{**

**fscanf(fin,"%f %f",&y[i],&x[i]);**

**printf("\n%f,%f\n",y[i],x[i]);**

**}**

**/\*loop end\*/**

**/\*statement for find a interpolation value for given point\*/**

**printf("\n enter the value of a:");**

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

**/\*calculation part \*/**

**sum1=0;**

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

**{**

**mul=1;**

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

**{**

**if(i!=j)**

**{**

**mul=mul\*((a-y[j])/(y[i]-y[j]));**

**}**

**}**

**sum1=sum1+(mul\*x[i]);**

**}**

**printf("\n when a=%f value of x=%f",a,sum1);**

**fprintf(fout,"\n when a=%f value of x=%f",a,sum1);**

**getch();**

**}**

**INPUT**

**11.38 93.0**

**12.80 96.2**

**14.70 100.0**

**17.07 104.2**

**19.91 108.7**

**OUTPUT**

**when a=13.500000 value of x=97.655746**