/\*LAGRANGE INTERPOLATION\*/

#include<stdio.h>

#include<math.h>

/\*Function to evaluate Li(x)\*/

float Li(int i, int n, float x[n+1], float X)

{

int j;

float prod=1;

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

{

if(j!=i)

prod=prod\*(X-x[j])/(x[i]-x[j]);

}

return prod;

}

/\*Function to evaluate Pn(x) where Pn is the Lagrange interpolating polynomial of degree n\*/

float Pn(int n, float x[n+1], float y[n+1], float X){

float sum=0;

int i;

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

{

sum=sum+Li(i,n,x,X)\*y[i];

}

return sum;

}

main()

{

int i,n;

printf("Enter the number of data-points:\n");

scanf("%d",&n);

n=n-1;

float x[n+1];

float y[n+1];

printf("Enter the x data-points:\n");

for(i=0;i<n+1;i++)

{

scanf("%f",&x[i]);

}

printf("Enter the y data-points:\n");

for(i=0;i<n+1;i++)

{

scanf("%f ",&y[i]);

}

float X;

printf("Enter the value of x for which you want the interpolated value of y(x):\n");

scanf("%f ",&X);

printf("The interpolated value is %f ",Pn(n,x,y,X));

}

/\* WEDDEL RULE\*/

#include<stdio.h>

float y(float x){

return 1/(1+x\*x); //function of which integration is to be calculated

}

int main()

{

float a,b,h,sum;

int i,n,m;

printf("Enter a=(lower limit), b=(upper limit), number of subintervals: ");

scanf("%f%f%d",&a,&b,&n);

h = (b-a)/n;

sum=0;

if(n%6==0){

sum=sum+((3\*h/10)\*(y(a)+y(a+2\*h)+5\*y(a+h)+6\*y(a+3\*h)+y(a+4\*h)+5\*y(a+5\*h)+y(a+6\*h)));

a=a+6\*h;

printf("Value of integral is %f\n", sum);

}

else{

printf("Sorry ! Weddle rule is not applicable");

}

}

/\*TRAPEZOIDAL RULE\*/

#include<stdio.h>

#include<math.h>

/\* Define the function to be integrated here: \*/

float f(float x)

{

return x\*x;

}

/\*Program begins\*/

main()

{

int n,i;

float a,b,h,x,sum=0,integral;

/\*Ask the user for necessary input \*/

printf("\nEnter the initial limit: ");

scanf("%f",&a);

printf("\nEnter the final limit: ");

scanf("%f",&b);

printf("\nEnter the no. of sub-intervals: ");

scanf("%d",&n);

h=fabs(b-a)/n;

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

{

x=a+i\*h;

sum=sum+f(x);

}

integral=(h/2)\*(f(a)+f(b)+2\*sum);

/\*Print the answer \*/

printf("\nThe integral is: %f\n",integral);

}

/\*SIMPSON'S 1/3 RULE\*/

#include<stdio.h>

#include<math.h>

float f(float x)

{

return x\*x;

}

main()

{

int n,i;

float a,b,h,x,sum=0,integral;

printf("\nEnter the initial limit: ");

scanf("%f ",&a);

printf("\nEnter the final limit: ");

scanf("%f ",&b);

printf("\nEnter the no. of sub-intervals(EVEN): ");

scanf("%d",&n);

h=fabs(b-a)/n;

if(n%2==0)

{

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

{

x=a+i\*h;

if(i%2==0)

{

sum=sum+2\*f(x);

}

else

{

sum=sum+4\*f(x);

}

}

integral=(h/3)\*(f(a)+f(b)+sum);

printf("\nThe integral is: %f \n",integral);

}else

printf(" error");

}