**EXPERIMENT-8**

**Arjun Dhawan-102016055-2CS10**

**COMPOSITE TRAPEZOIDAL RULE -**

Algorithm :

1. Input function and and number of sub intervals
2. Calculate h
3. Repeat next steps(4 and 5) from 1 to n-1
4. x=a+h\*i;
5. sum=sum+2\*f(x);
6. print answer

**COMPOSITE SIMPSON’S RULE** -

Algorithm :

1. Input function and and number of sub intervals
2. Calculate h
3. Repeat next step (4) from 1 to n-1
4. x=a+h\*i;

if rem(i,2)==0

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

else

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

1. print answer

**Trapezoidal rule** -

**3) a)**

f=@(x) (cos(x))^2;

a=-0.25;

b=0.25;

n=4;

h=(b-a)/n;

sum=0;

for i=1:n-1

x=a+h\*i;

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

end

sum=sum+f(a)+f(b);

ans=(sum\*h)/2;

disp(ans);



f=@(x) 1/(x\*(log(x)));

a=exp(1);

b=exp(1)+1;

n=4;

h=(b-a)/n;

sum=0;

for i=1:n-1

x=a+h\*i;

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

end

sum=sum+f(a)+f(b);

ans=(sum\*h)/2;

disp(ans);



f=@(x) exp(-power(x,2))\*cos(x);

a=-1;

b=1;

n=4;

h=(b-a)/n;

sum=0;

for i=1:n-1

x=a+h\*i;

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

end

sum=sum+f(a)+f(b);

ans=(sum\*h)/2;

disp(ans);



**Simpson rule** -

**3) a)**

f=@(x) (cos(x))^2;

a=-0.25;

b=0.25;

n=4;

h=(b-a)/n;

sum=0;

for i=1:n-1

x=a+h\*i;

if rem(i,2)==0

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

else

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

end

end

sum=sum+f(a)+f(b);

ans=(sum\*h)/3;

disp(ans);



**b)**

f=@(x) 1/(x\*(log(x)));

a=exp(1);

b=exp(1)+1;

n=4;

h=(b-a)/n;

sum=0;

for i=1:n-1

x=a+h\*i;

if rem(i,2)==0

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

else

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

end

end

sum=sum+f(a)+f(b);

ans=(sum\*h)/3;

disp(ans);



f=@(x) exp(-power(x,2))\*cos(x);

a=-1;b=1;

n=4;

h=(b-a)/n;

sum=0;

for i=1:n-1

x=a+h\*i;

if rem(i,2)==0

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

else

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

end

end

sum=sum+f(a)+f(b);

ans=(sum\*h)/3;

disp(ans);



**4)**

1. **Trapezoidal rule -**

With 4 intervals –

clc

syms x;

g=(atan(1+x^2));

gdiff= (diff(g,x));

I= inline(gdiff);

f= @(x)(sqrt(1+(I(x))^2));

a=0;

b=2;

n=4;

h=(b-a)/n;

sum=0;

for i=1:n-1

x=a+h\*i;

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

end

sum=sum+f(a)+f(b);

ans=(sum\*h)/2;

disp(ans);



With 8 intervals-

clc

syms x;

g=(atan(1+x^2));

gdiff= (diff(g,x));

I= inline(gdiff);

f= @(x)(sqrt(1+(I(x))^2));

a=0;

b=2;

n=8;

h=(b-a)/n;

sum=0;

for i=1:n-1

x=a+h\*i;

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

end

sum=sum+f(a)+f(b);

ans=(sum\*h)/2;

disp(ans);

1. **Simpson’s rule -**

With 4 intervals-

clc

syms x;

g=(atan(1+x^2));

gdiff= (diff(g,x));

I= inline(gdiff);

f= @(x)(sqrt(1+(I(x))^2));

a=0;

b=2;

n=4;

h=(b-a)/n;

sum=0;

for i=1:n-1

x=a+h\*i;

if rem(i,2)==0

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

else

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

end

end

sum=sum+f(a)+f(b);

ans=(sum\*h)/3;

disp(ans);



With 8 intervals –

clc

syms x;

g=(atan(1+x^2));

gdiff= (diff(g,x));

I= inline(gdiff);

f= @(x)(sqrt(1+(I(x))^2));

a=0;

b=2;

n=8;

h=(b-a)/n;

sum=0;

for i=1:n-1

x=a+h\*i;

if rem(i,2)==0

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

else

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

end

end

sum=sum+f(a)+f(b);

ans=(sum\*h)/3;

disp(ans);

