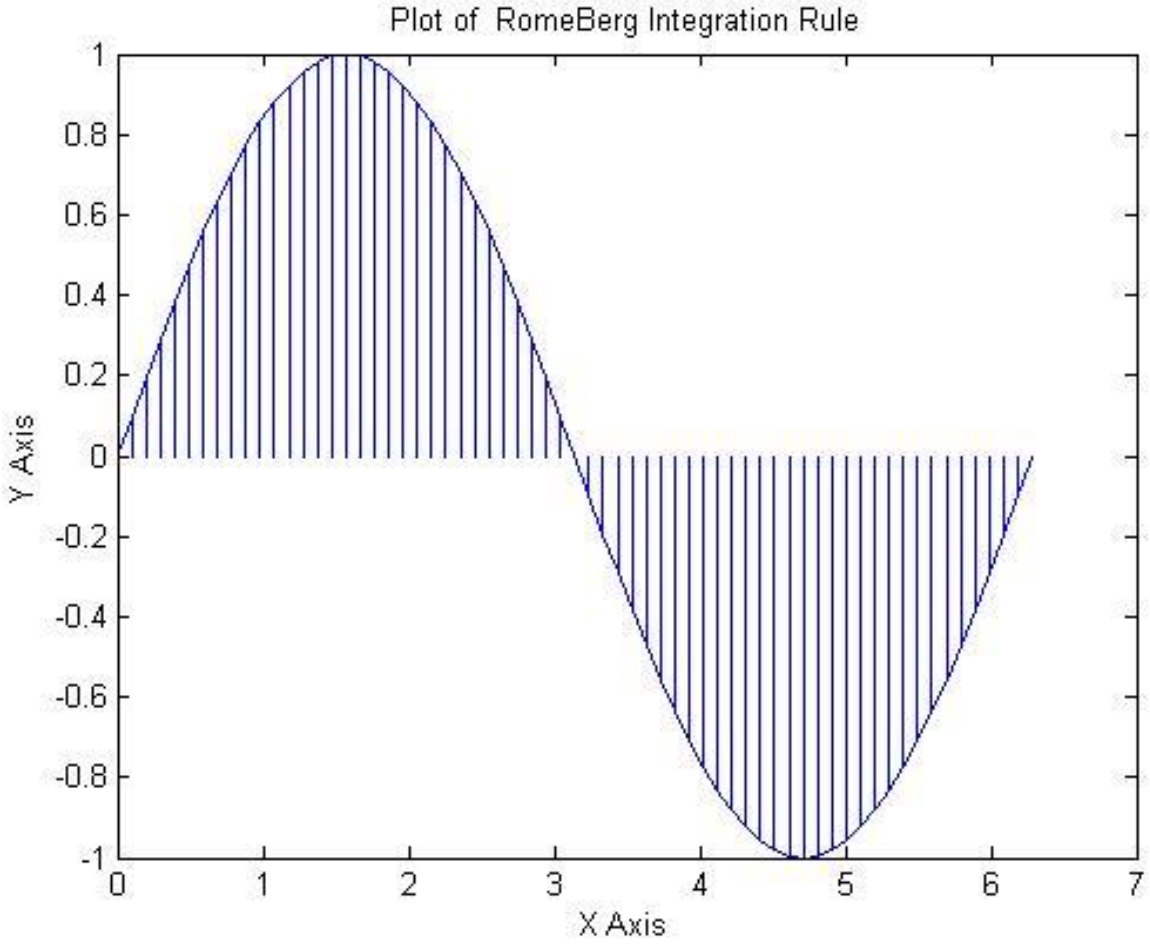
```
% Romberg integration
clc
clear
close all
%===========input section=================
 g = input('Enter the function: ','s');
 f = inline(g);
 a = input('Enter lower limit, a:  ');
 b = input('Enter upper limit, b:  ');
 n=input('Enter number of intervals (multiple of 6)=');

 h = b-a;
 r = zeros(2,n+1);
 r(1,1) = (f(a)+f(b))/2*h;
 fprintf('\nRomberg integration table:\n');
 fprintf('\n %11.8f\n\n', r(1,1));

%==============loop================
 for i = 2:n
    sum = 0;
    for k = 1:2^(i-2)
       sum = sum+f(a+(k-0.5)*h);
    end
    r(2,1) = (r(1,1)+h*sum)/2;

    for j = 2:i
       I = 2^(2*(j-1));
       r(2,j) = r(2,j-1)+(r(2,j-1)-r(1,j-1))/(I-1);
    end

    for k = 1:i
       fprintf(' %11.8f',r(2,k));
    end

    fprintf('\n\n');
    h = h/2;
    for j = 1:i
       r(1,j) = r(2,j);
    end
 end
 %==============graph===============
 x = linspace(a,b,2^n+1);
 y=f(x);
 plot(x,y)
 title('Plot of  RomeBerg Integration Rule');
 xlabel('X Axis') ;
 ylabel('Y Axis') ;

 hold on
 for i=1:2^n
     plot([x(i),x(i)],[0,y(i)]);
```

```
end
```

Output

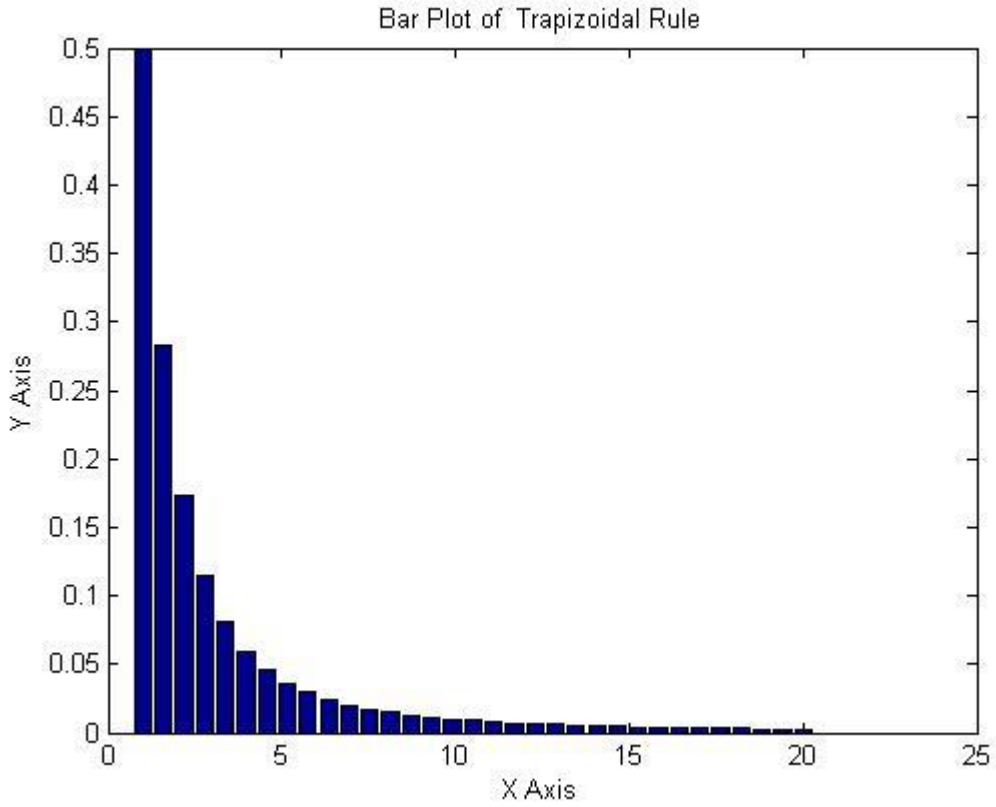
```
Enter the function: x.*sin(x)
Enter lower limit, a:  0
Enter upper limit, b:  2.*pi
Enter number of intervals = 6
Romberg integration table:
 -0.00000000
 -0.00000000  0.00000000
 -4.93480220 -6.57973627 -7.01838535
 -5.95683320 -6.29751020 -6.27869513 -6.26695401
 -6.20223150 -6.28403093 -6.28313231 -6.28320274 -6.28326646
 -6.26298595 -6.28323743 -6.28318453 -6.28318536 -6.28318529 -
6.28318521
```



```
% Trapizoidal Rule
clc
clear
close all

%===========input section==================
 g = input('Enter the function: ','s');
 f = inline(g);
 a = input('Enter lower limit, a:  ');
 b = input('Enter upper limit, b:  ');
 n = input('Enter no. of subintervals, n:  ');

 h=(b-a)/n;
 S = f(a)+f(b);
 for i=1:n-1
     S = S+2*f(a+i*h);
 end
 I = h/2 *S;
 fprintf('The value of integration is %f \n', I);

 %==========plot============
  x = linspace(a,b,2^n+1);
 y=f(x);
 plot(x,y)
 title('Bar Plot of  Trapizoidal Rule');
 xlabel('X Axis') ;
 ylabel('Y Axis') ;

 hold on
 for i=1:2^n
     plot([x(i),x(i)],[0,y(i)]);
 end
```

Output

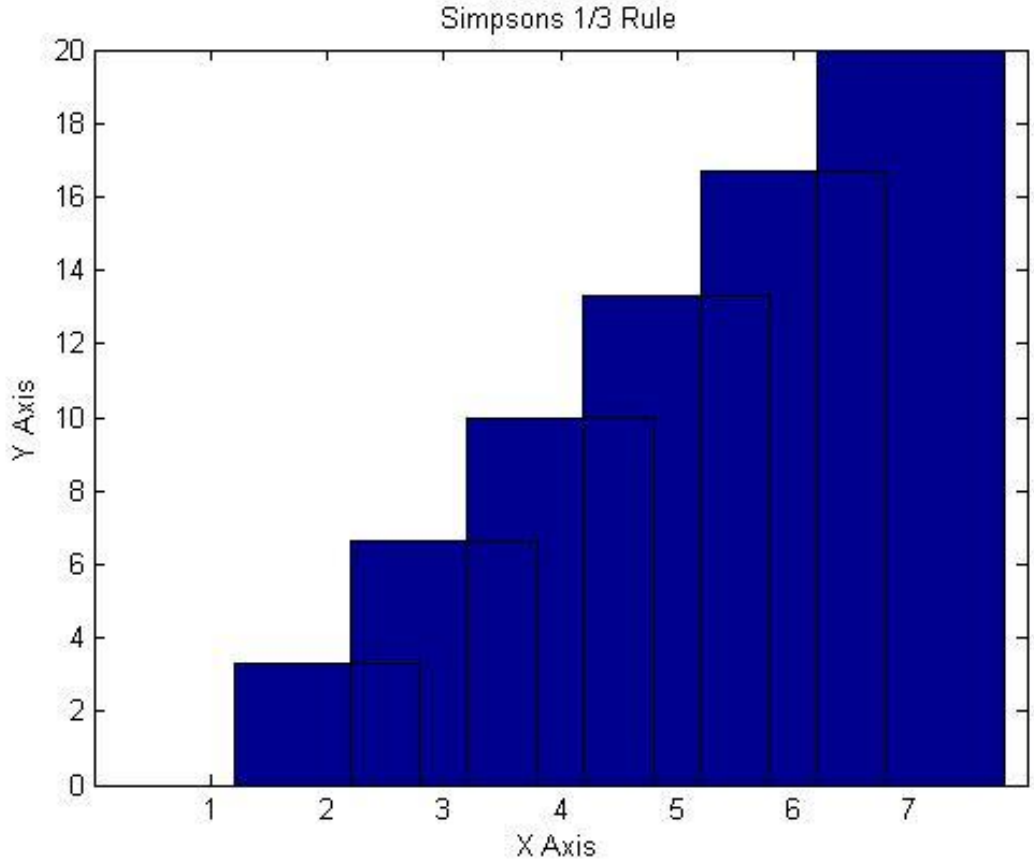
```
Enter the function: 1./(1+x.^2)
Enter lower limit, a:  1
Enter upper limit, b:  20
Enter no. of subintervals, n:  5
The value of integration is 1.202480
```


Bar Plot of Trapizoidal Rule
Y Axis
X Axis
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
5
10
15
20
25

```
% Composite Simpson 1/3 Rule
clc
clear
close all
%===========input section=================
 g = input('Enter the function: ','s');
 f = inline(g);
 a = input('Enter lower limit, a:  ');
 b = input('Enter upper limit, b:  ');
 n=input('Enter number of intervals (multiple of 3)=');

 h=(b-a)/n;
 x=a:h:b;
 sum1 = 0;
 sum2 = 0;
 for i = 1:n-1
     if mod(i,2)==0;
         sum2 = sum2+f(a+i*h);
     else
         sum1 = sum1+f(a+i*h);
     end
 end
 y = h/3.*(f(a)+f(b)+4.*sum1+2.*sum2);
 fprintf('The value of y is: %f\n\n', y);
 bar(x,y)
  title( 'Simpsons 1/3 Rule');
 xlabel('X Axis') ;
 ylabel('Y Axis') ;
```

Output

```
Enter the function: 1./(1+x.^2)

Enter lower limit, a:  0

Enter upper limit, b:  20

Enter number of intervals (multiple of 3)=6

The value of y is: 1.602131
```


Simpsons 1/3 Rule
Y Axis
X Axis
0
2
4
6
8
10
12
14
16
18
20
1
2
3
4
5
6
7

```
% Numerical Analysis Simpson 3/8 Rule using MATLAB
clear all;
close all;
clc;


g = input('Enter the function: ','s');
 f = inline(g);
a=input('Enter lower limit of integral=');
b=input('Enter upper limit of integral=');
n=input('Enter number of intervals (multiple of 3)=');
h=(b-a)/n;
sum1=0.0;
sum2=0.0;
sum3=0.0;
x=a:h:b;

for i=1:3:n-2
    x=a+i*h;
    sum1=sum1+f(x);
end
for i=2:3:n-1
    x=a+i*h;
    sum2=sum2+f(x);
end
for i=3:3:n-3
    x=a+i*h;
    sum3=sum3+f(x);
end

simp=3*h*(f(a)+3.0*sum1+3.0*sum2+2.0*sum3+f(b))/8.0;
fprintf('Integrated value is %f',simp)
 bar(x,simp)
  title(' Plot of Simpson 3/8 Rule using MATLAB');
 xlabel('X Axis') ;
 ylabel('Y Axis') ;
```

OutPut

```
Enter the function: 1./(1+x.^2)
Enter lower limit of integral=1
Enter upper limit of integral=20
Enter number of intervals (multiple of 3)=6
Integrated value is 0.908619
```