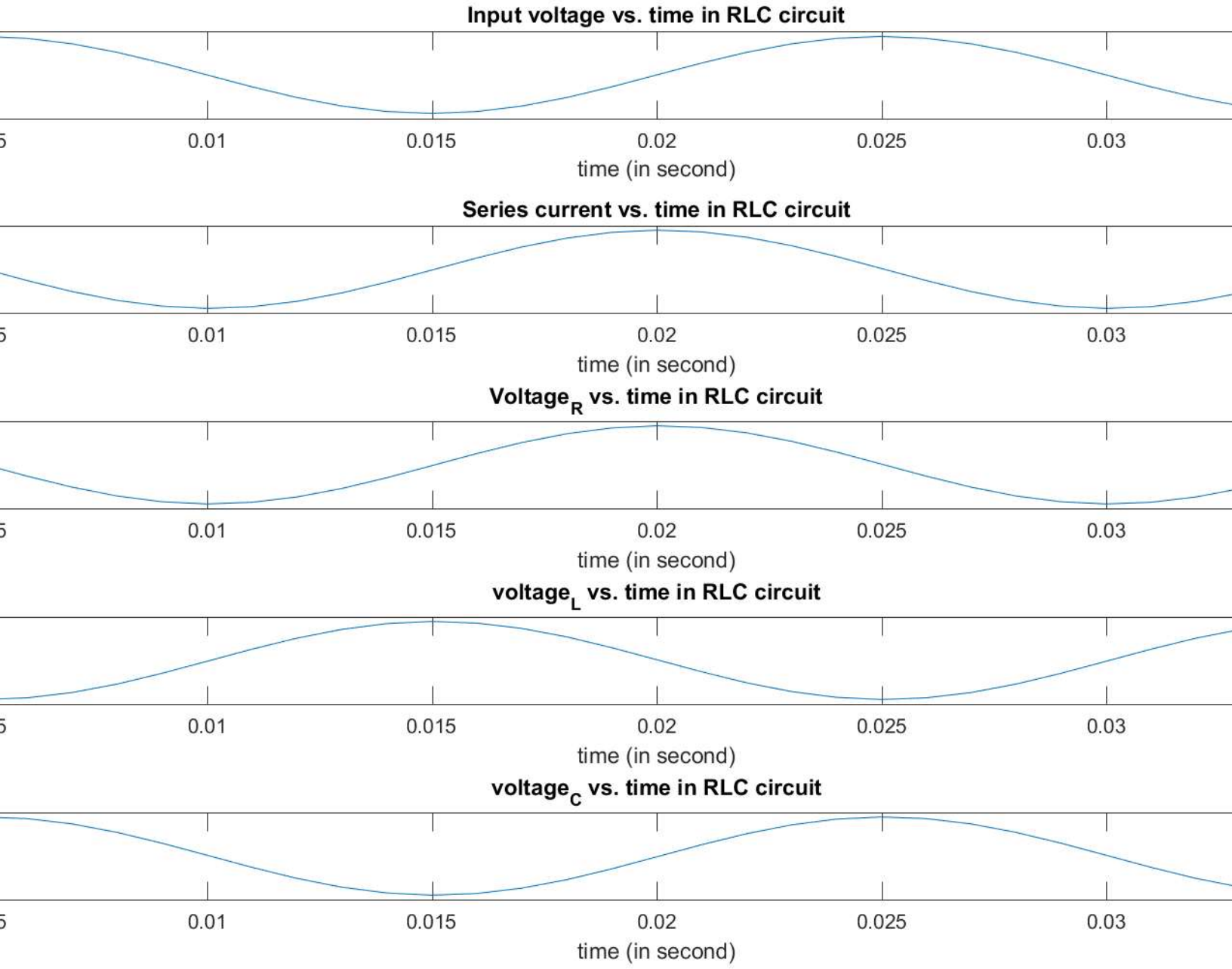
```
clc;
clear all;
close all;
R=1000;
L=3.18;
C = 3.18*10^-6;
b = inv(2*pi*C);
f=50;
Vin=220*sqrt(2)+0i;
c =2*pi*f*L;
%Phase angle of Input voltage has been taken as reference
%rms value of input voltage is 220 V
Z=R+ c*1i -b*1i;
ZLC = c*1i - b*1i;
vr = R/Z*Vin;
vlc = ZLC/Z*Vin;
vl = c*1i/ZLC*vlc;
vc = -b*1i/ZLC*vlc;

%Finding value of total impedance from the value of R and L
%Z=R+jX
I=Vin/Z;
%Finding series current, I
amplitude_I=sqrt(2)*abs(I);
angle_I=angle(I);
%Finding magnitude and angle of I
%Converting rms to peak value
amplitude_Vr=sqrt(2)*abs(vr);
angle_Vr=angle(vr);
amplitude_Vl=sqrt(2)*abs(vl);
angle_Vl=angle(vl);
amplitude_Vc=sqrt(2)*abs(vc);
angle_Vc=angle(vc);
amplitude_V=sqrt(2)*abs(Vin);
angle_V=angle(Vin);
%Finding magnitude and angle of Vin
t=0:1/(20*f):2/f;
%time array for plotting first two cycles of Vin and I
V_in=amplitude_V*sin(2*pi*f*t+angle_V);
I_t=amplitude_I*sin(2*pi*f*t+angle_I);
V_r=amplitude_Vr*sin(2*pi*f*t+angle_Vr);
V_l=amplitude_Vl*sin(2*pi*f*t+angle_Vl);
V_c=amplitude_Vc*sin(2*pi*f*t+angle_Vc);
%Finding Instantaneous value of input Vin and I
subplot(5,1,1), plot(t,V_in);
title('Input voltage vs. time in RLC circuit')
xlabel('time (in second)'),ylabel('Voltage (in Volt)');
subplot(5,1,2), plot(t,I_t);
title('Series current vs. time in RLC circuit')
```

```
xlabel('time (in second)'),ylabel('Series current (in Ampere)');
subplot(5,1,3), plot(t,V_r);
title('Voltage_R vs. time in RLC circuit')
xlabel('time (in second)'),ylabel('Voltage (in Volt)');
subplot(5,1,4), plot(t,V_l);
title('voltage_L vs. time in RLC circuit')
xlabel('time (in second)'),ylabel('Voltage (in Volt)');
subplot(5,1,5), plot(t,V_c);
title('voltage_C vs. time in RLC circuit')
xlabel('time (in second)'),ylabel('Voltage (in Volt)');
```


Input voltage vs. time in RLC circuit
0.01
0.015
0.02
0.025
0.03
time (in second)
Series current vs. time in RLC circuit
0.01
0.015
0.02
0.025
0.03
time (in second)
Voltage$_R$ vs. time in RLC circuit
0.01
0.015
0.02
0.025
0.03
time (in second)
voltage$_L$ vs. time in RLC circuit
0.01
0.015
0.02
0.025
0.03
time (in second)
voltage$_C$ vs. time in RLC circuit
0.01
0.015
0.02
0.025
0.03
time (in second)

```
%2. matrix operations,loop etc.problem 2:
close all; clear all; clc;
a = [1 -2 3; 3 0 4; -8 9 -11];
for i =1:size(a,1)
    for j = 1:size(a,2)
        if a(i,j) < 0
            a(i,j) = 0;
        else
            a(i,j) = 1;
        end
    end
end
a
```

```
a =

     1     0     1
     1     1     1
     0     1     0
```

```
%matrix. problem-3:
close all; clear all; clc;
q_mat = [15 20 10 12];
min = q_mat(1,1); s = min;
for j = 2:size(q_mat,2)
    s = s+ q_mat(1,j);
    if q_mat(1,j) < min
        min = q_mat(1,j);
    end
end
average = (s - min)/3
```

```
average =

   15.6667

>>
```

```
close all; clear all; clc;
a = [1 -2 3;3 0 4;-8 9 -11]
diag_sum(a)
b = [1 -2 3;3 0 4;-8 9 11]
diag_sum(b)
c = [2 -2 3;3 0 4;-8 9 7]
diag_sum(c)
```

```
function [] = diag_sum( a )
sm = 'sum of the diagonal elements is smaller.';
l ='sum of the diagonal elements is larger.';
same ='sum of the diagonal elements is same.';
s = 0; b = 0;
for i = 1:size(a,1)
    for j = 1:size(a,2)
        if i == j
            s = s + a(i,j);
        else
            b = b + a(i,j);
        end
    end
end
if s > b
    disp(l)
else if s < b
        disp(sm)
    else disp(same)
    end
end
end
```

Command Window

```
a =

     1    -2     3
     3     0     4
    -8     9   -11

sum of the diagonal elements is smaller.

b =

     1    -2     3
     3     0     4
    -8     9    11

sum of the diagonal elements is larger.

c =

     2    -2     3
     3     0     4
    -8     9     7

sum of the diagonal elements is same.
fx >>
```

```
%assignment 8_fibonacci
n = input('Enter number of term for displaying fibonacchi: ');
fib(1) = 0; fib(2) = 1;
for i = 3:n+1
        fib(i) = fib(i-1) + fib(i-2);
end
disp(fib(2:length(fib)));
```

```
Enter number of term for displaying fibonacchi: 5
     1     1     2     3     5

>> matrix_problem_5
Enter number of term for displaying fibonacchi: 8
  Columns 1 through 5

     1     1     2     3     5

  Columns 6 through 8

     8    13    21
```

Editor - D:\matrix_problem_5.m

inter.m | matrix_problem_5.m

```
1     %problem6
2 -   close all;
3 -   clear all;
4 -   clc;
5 -   t = linspace(0,.02);
6 -   v = 10*sin(100*pi*t + 45);
7 -   i = .2*sin(100*pi*t+135);
8 -   subplot(2,1,1), plot(t,v);
9 -   xlabel('time (s)'),ylabel('voltage (v)')
10 -  subplot(2,1,2), plot(t,i);
11 -  xlabel('time (s)'),ylabel('current (A)')
12
```

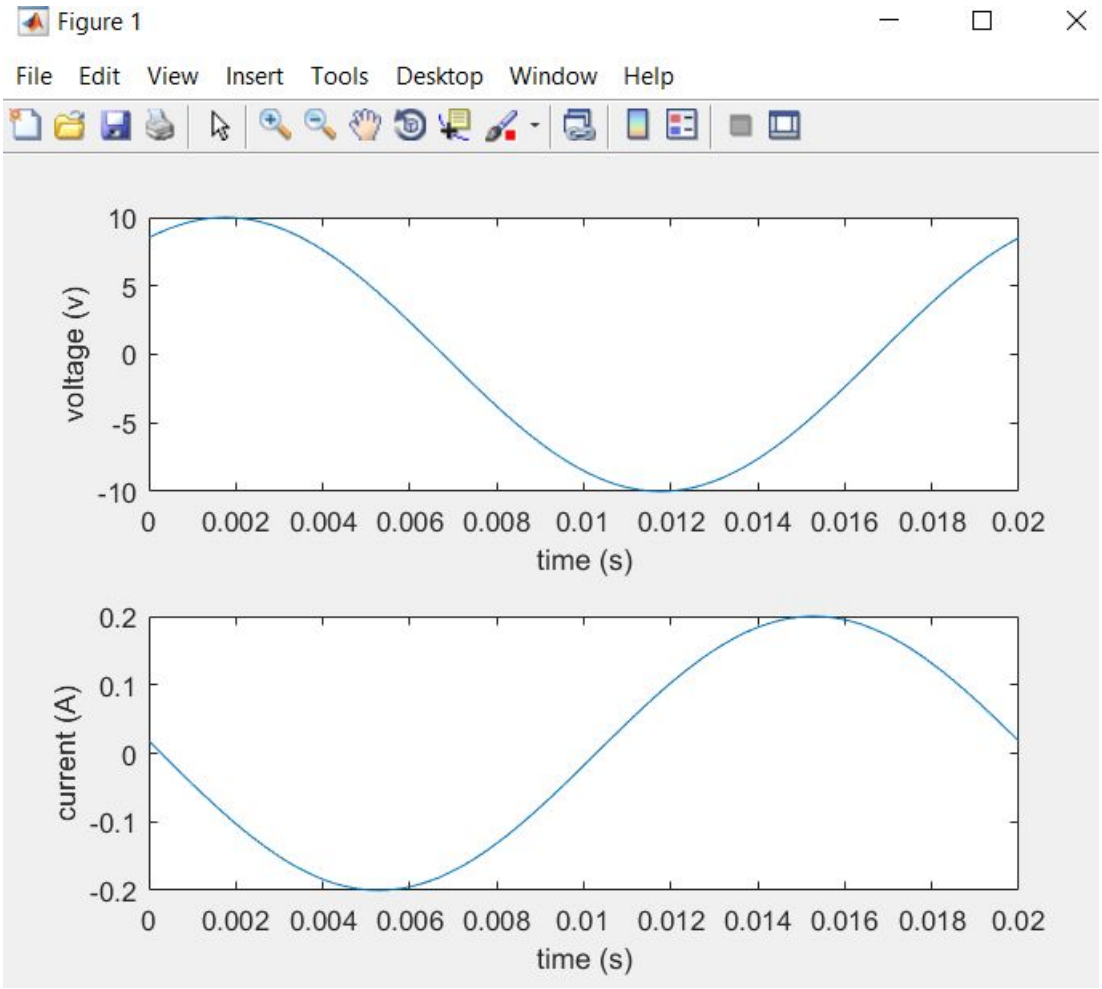


Figure 1
File Edit View Insert Tools Desktop Window Help
10
5
0
-5
-10
voltage (v)
0 0.002 0.004 0.006 0.008 0.01 0.012 0.014 0.016 0.018 0.02
time (s)
0.2
0.1
0
-0.1
-0.2
current (A)
0 0.002 0.004 0.006 0.008 0.01 0.012 0.014 0.016 0.018 0.02
time (s)

Editor - D:\matrix_problem_6.m

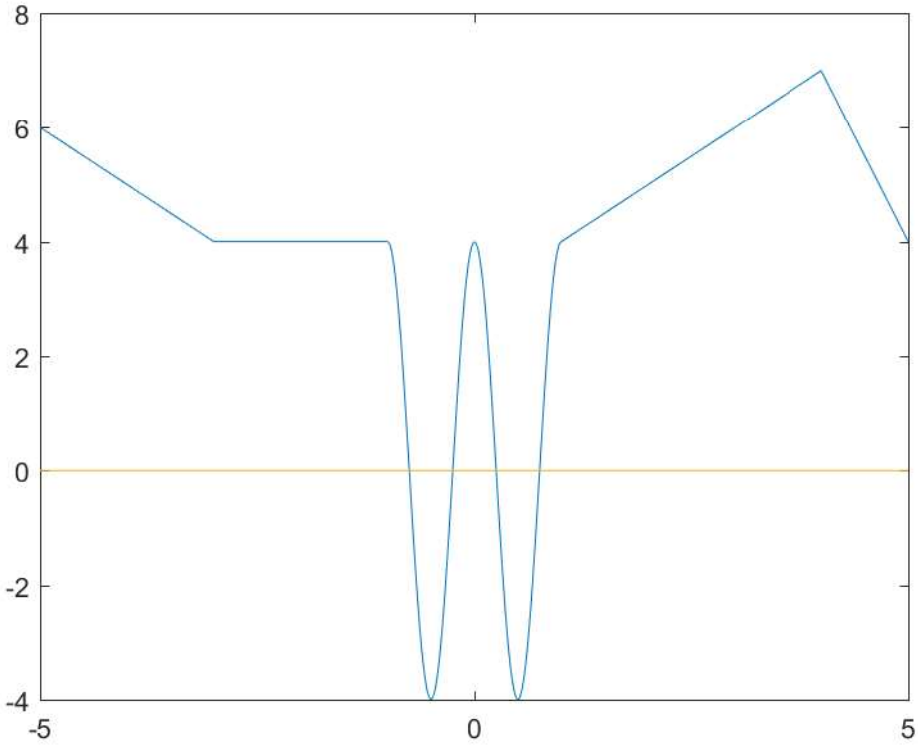
inter.m | matrix_problem_6.m

```
1     %problem7
2 -   close all;
3 -   clear all;
4 -   clc; s = 0;
5 -   A = [1 4 3 15 6];
6 -   for j = 1:size(A,2)
7 -           if A(1,j) > s
8 -               s = A(1,j);
9 -           end
10 -  end
11
12 -  for j = 1:size(A,2)
13 -          if A(1,j) == s
14 -              disp(j)
15 -          end
16 -  end
17
```

Command Window

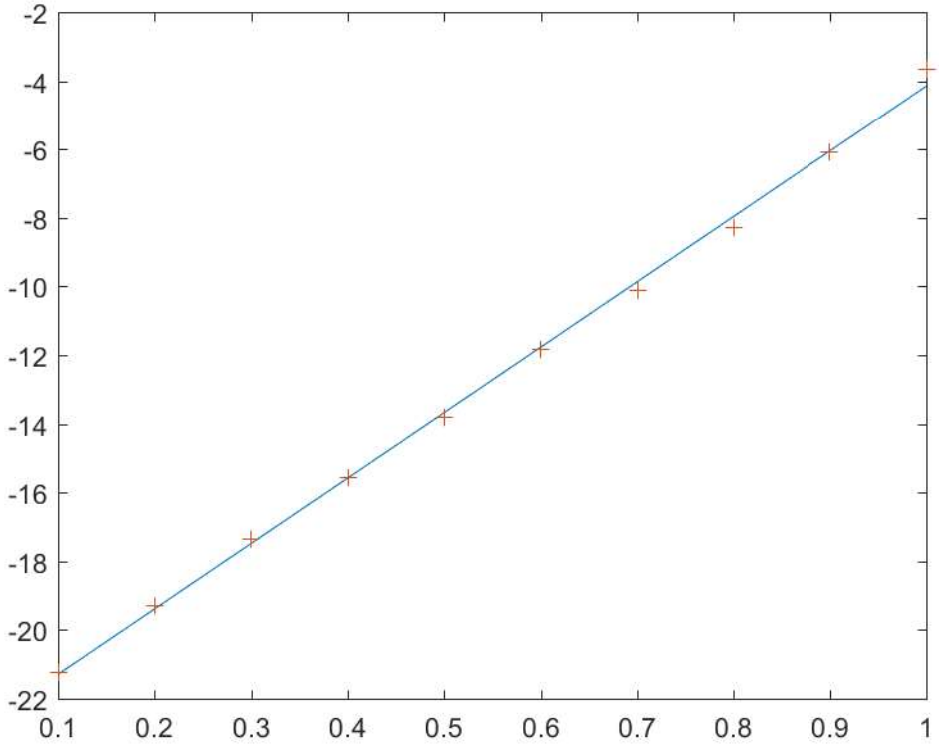
```
     4

fx >>
```

```
close all; clc; clear all;
t=linspace(-5,5,500);
x = zeros(length(t));
for i = 1:length(t)
    if t(i) >= -5 && t(i) <= -3
        x(i) = -t(i)+1;
    elseif t(i) >= -3 && t(i) <= -1
        x(i) = 4;
    elseif t(i) >= -1 && t(i) <= 1
        x(i) = 4*cos(2*pi*t(i));
    elseif t(i) >= 1 && t(i) <= 4
        x(i) = t(i) +3;
    elseif t(i) >= 4 && t(i) <= 5
        x(i) = -3*t(i) + 19;
    end
end
plot(t,x);
```


8
6
4
2
0
-2
-4
-5
0
5

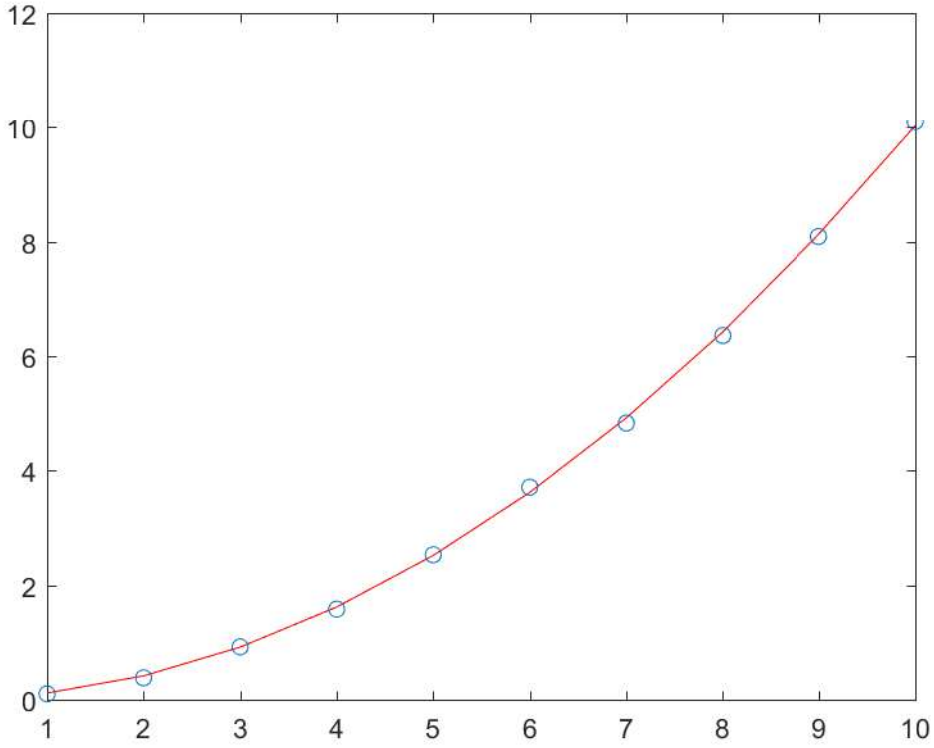
```
close all; clear all; clc;
Vd=[.1 .2 .3 .4 .5 .6 .7 .8 .9 1.0];
Id=[0.6*10^(-9) 4.2*10^(-9) 29*10^(-9) 176*10^(-9) 10^(-6) 7.3*10^(-6)↙
40*10^(-6) 252*10^(-6) 2.3*10^(-3) 26*10^(-3) ];
A=[length(Vd) sum(Vd);sum(Vd) sum(Vd.^2)];
B=[sum(log(Id)); sum(Vd.*(log(Id)))];
a=A\B;
z=a(1)+a(2).*Vd;
format long
Is=exp(a(1))
n=1/(a(2)*0.025875)
plot(Vd,z, '-' ,Vd,log(Id), '+' )
```

```
ls =

    4.0146015077814 90e-05


n =

  15.135055412689789

>>
```


-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

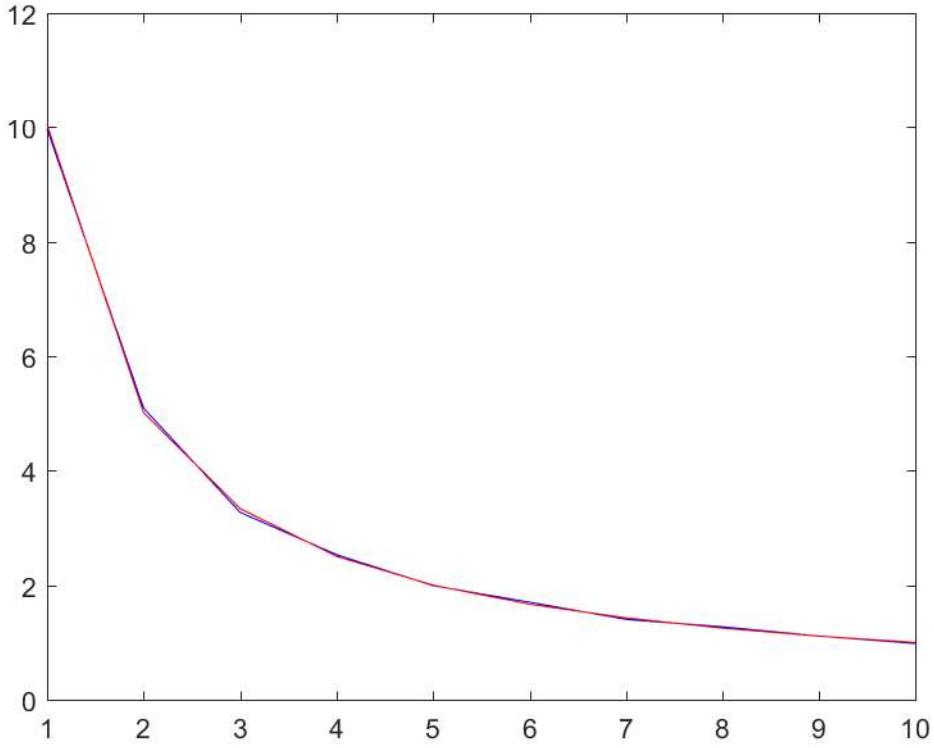
```
close all; clear all; clc;
Vr = [1 2 3 4 5 6 7 8 9 10];
Pr = [.1 .38 .92 1.58 2.53 3.71 4.83 6.36 8.09 10.1];
n = length(Vr);
format long;
A = [n sum(log(Vr));sum(log(Vr)) sum((log(Vr)).^2)];
X = [];
Y = [sum(log(Pr)) sum(log(Pr).*log(Vr))];
X = Y/A;
a0 = X(1,1); a1 = X(1,2);
R = exp(-a0)
n = a1
yid = (Vr).^n./R;
plot(Vr,Pr,'o');
hold on;
plot(Vr,yid)
```

```
close all; clear all; clc;
%task 2
Vr = [1 2 3 4 5 6 7 8 9 10];
Pr = [.1 .38 .92 1.58 2.53 3.71 4.83 6.36 8.09 10.1];
n = length(Vr);
A = [n sum(Vr) sum(Vr.^2);sum(Vr) sum(Vr.^2) sum(Vr.^3);sum(Vr.^2) sum(Vr.↙
^3) sum(Vr.^4)];
X = [];
Y = [sum(Pr); sum(Pr.*Vr); sum(Pr.*(Vr.^2))];
X = Y\A;
a0 = X(1)
a1 = X(2)
a2 = X(3)
yid = a0+a1.^Vr+a2.*(Vr.^2);
plot(Vr,yid./100,'r',Vr,Pr,'o');
```


12
10
8
6
4
2
0
1
2
3
4
5
6
7
8
9
10

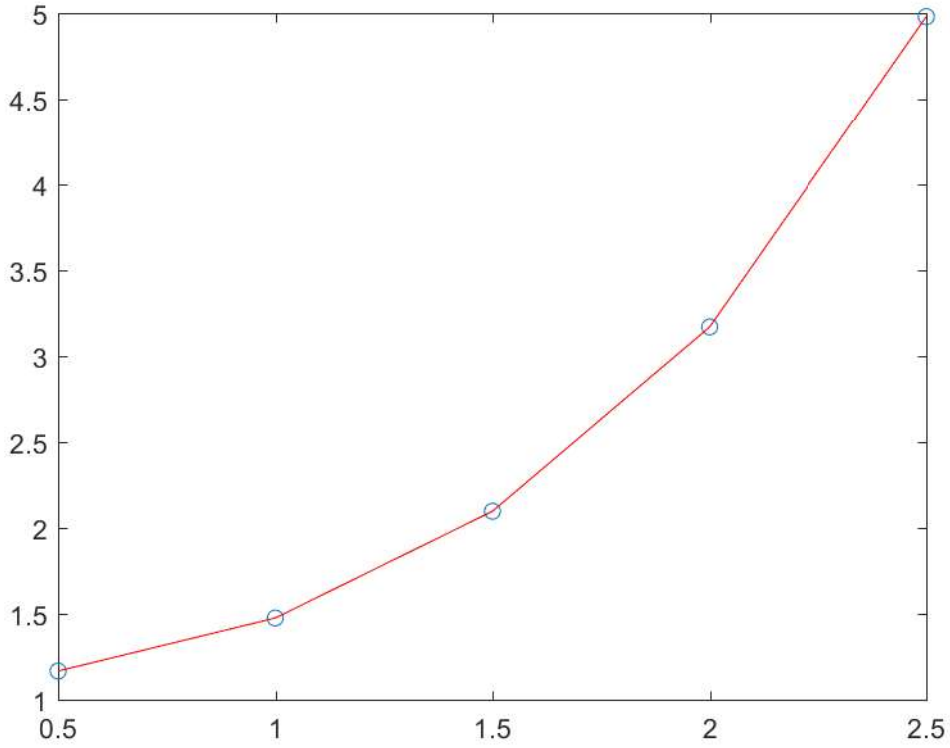
```
a0 =

   0.151958766215834


a1 =

   1.191639549119859


a2 =

   9.969768712606626

>>
```

```
close all; clear all; clc;
r = [1 2 3 4 5 6 7 8 9 10];
i = [9.97 5.09 3.27 2.53 1.99 1.7 1.4 1.27 1.11 .98];
I = log(i);R = log(r);
A = [length(r) sum(R);sum(R) sum(R.^2)];
Y = [sum(I); sum(I.*R)];
x = A\Y;
Vs = exp(x(1))
n = -x(2)
plot(r,i,'b');
hold on;
yi = Vs./(R.^n);
yi = x(1)+x(2).*R;
plot(r,exp(yi),'r');
```


12
10
8
6
4
2
0
1
2
3
4
5
6
7
8
9
10

```
Vs =

    10.0438002080931


n =

    1.00310279422768

>>
```

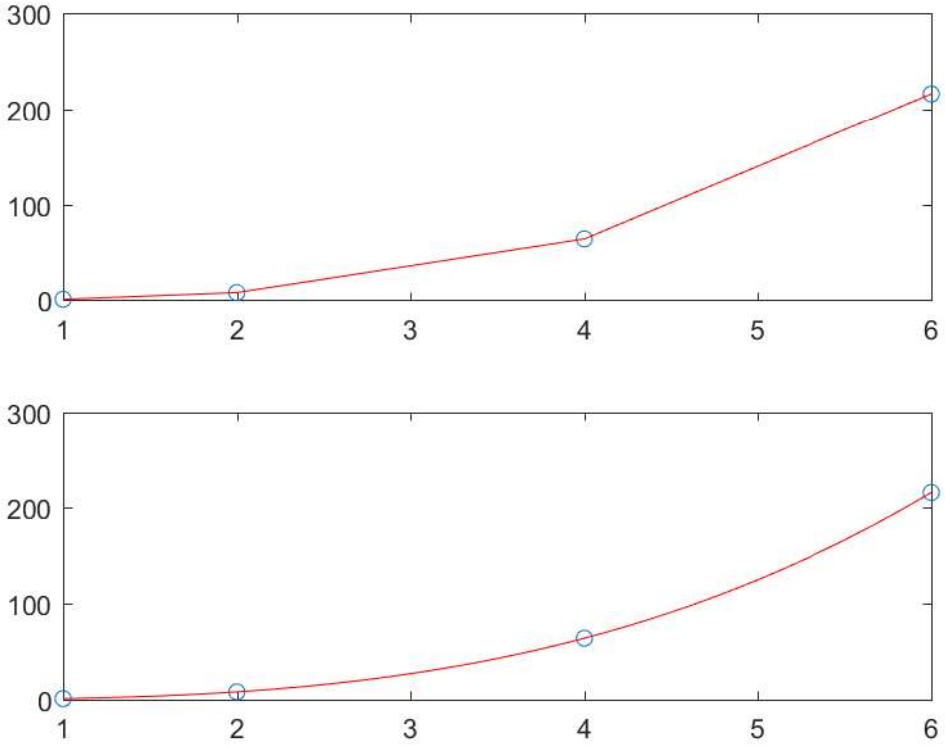
```
close all; clear all; clc;
r = [.5 1 1.5 2 2.5];
i = [1.166 1.475 2.0967 3.17 4.98 ];
l = log(i);R = log(r);
A = [length(r) sum(R) sum(R.^2) sum(R.^3) sum(R.^4);sum(R) sum(R.^2) sum(R.^3) sum(R.^4) sum(R.^5);sum(R.^2) sum(R.^3) sum(R.^4) sum(R.^5) sum(R.^6);sum(R.^3) sum(R.^4) sum(R.^5) sum(R.^6) sum(R.^7);sum(R.^4) sum(R.^5) sum(R.^6) sum(R.^7) sum(R.^8)];
Y = [sum(l);sum(l.*R);sum(l.*(R.^2)); sum(l.*(R.^3));sum(l.*(R.^4))];
x = A\Y;
yi = x(1)+x(2).*R +x(3).*(R.^2)+x(4).*(R.^3)+x(5).*(R.^4);
plot(r,i,'o');
hold on;
plot(r,exp(yi),'r');
```


5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
1
1.5
2
2.5

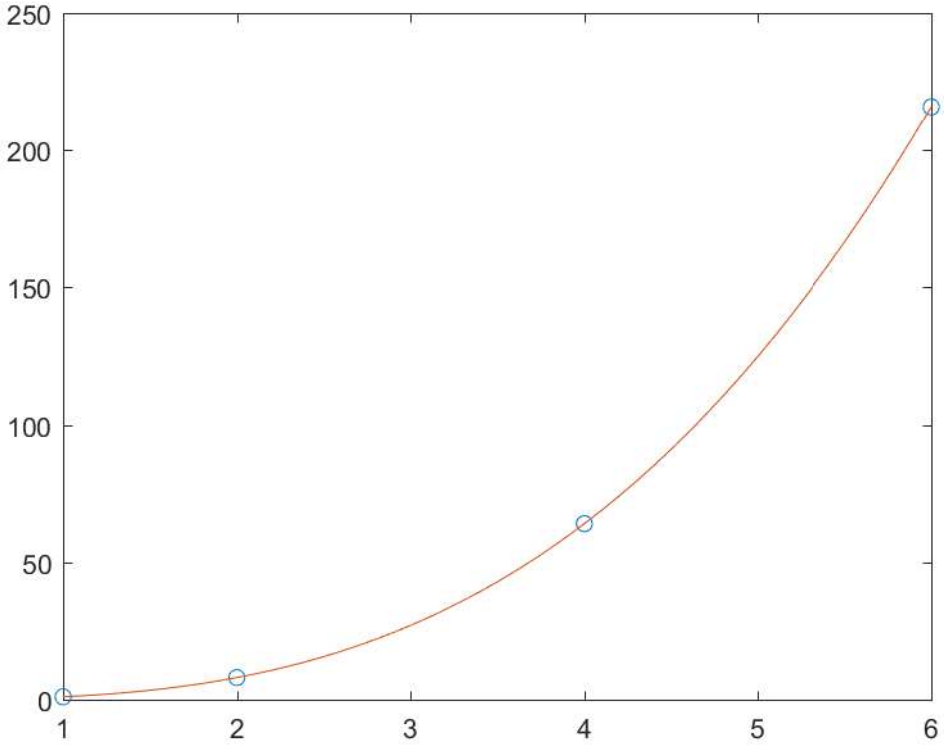
```
%interpolation. problem1 & 2
close all; clear all; clc;
x = [1 2 4 6];
y = [1 8 64 216];
xn = x(1):0.1:x(end);
yn = linear_interp(x,y,xn);
ynp=polynomial_interp(x,y,xn);
subplot(2,1,1)
plot(x,y,'o',xn,yn,'r');
subplot(2,1,2)
plot(x,y,'o',xn,ynp,'r');
```

```
function [ yn ] = linear_interp( x,y,xn )
n = length(x); N = length(xn);
m = 1;
for i = 1:N
    for j = 1:n-1
        if xn(i) > x(j) && xn(i) < x(j+1)
            m=j;
        end
    end
    yn(i)=((xn(i)-x(m+1))*y(m)/(x(m)-x(m+1)))-((xn(i)-x(m))*y(m+1)/(x(m)-x(m+1)));
end
end
```

```
function [ yn ] = polynomial_interp(x,y,xn)
n=length(x);
N=length(xn);
for i=1:N
    p = 0;
    for j = 1:n
        s = 1;
        for k = 1:n
            if j~=k
                s=s*(xn(i)-x(k))/(x(j)-x(k));
            end
        end
        p=p+s*y(j);
    end
    yn(i) = p;
end
```


300
200
100
0
1
2
3
4
5
6
300
200
100
0
1
2
3
4
5
6

```
%Interpolation,Problem 3
close all; clear all; clc;
n=input('Number of data points:');
for i=1:n
 x(i)=input('x value:');
 y(i)=input('y value:');
end
interp_mode=input('Press 1 for linear and 2 for polynomial:');
xn=x(1):0.1:x (end);
if interp_mode == 1
    yn  = linear_interp( x,y,xn );
else
    yn = polynomial_interp(x,y,xn);
end
plot(x,y,'o',xn,yn);
```


250
200
150
100
50
0
1
2
3
4
5
6

```
Number of data points:4
x value:1
y value:1
x value:2
y value:8
x value:4
y value:64
x value:6
y value:216
Press 1 for linear and 2 for polynomial:2
>>
```

```
%RootFinding. problem 1
close all;clear all;clc;
f=inline('cos(x)');
xup=input('upper value=' );
xlow=input('lower value=' );
tol=input('tolerance=' );
root=root_find(f,xup,xlow,tol)
```

```
function [ r ] = root_find( f,x,y,xt )
for i=1:1000
    if y+.1<x
        xu(i) = y+.1;
        xl(i) = y;
        y=y+.1;
    else
        xu(i) = x;
        xl(i) = y;
        break
    end
end
p=1;
for i = 1:length(xu)
    if f(xu(i))*f(xl(i)) <= 0
        while abs(xu(i)-xl(i)) > xt
            xm = (xu(i) + xl(i))/2;
            if f(xl(i))*f(xm)>0
                xl(i) = xm;
            else
                xu(i) = xm;
            end
        end
        r(p) = xm;
        p=p+1;
    end
end
end
```

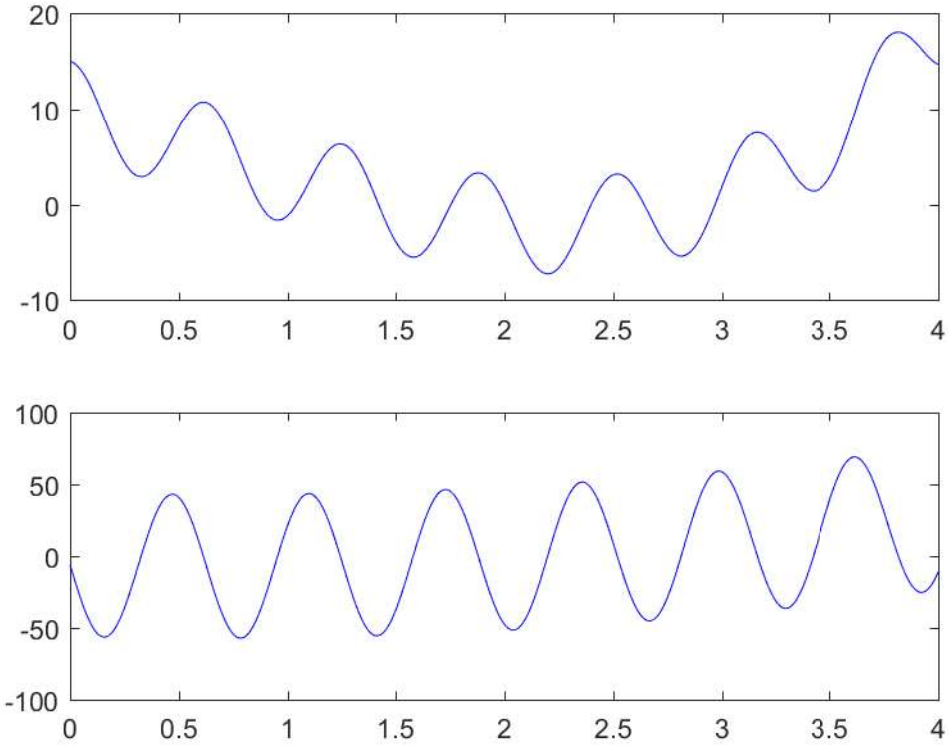
```
upper value=10
lower value=-10
tolerance=.0001

root =

  Columns 1 through 2

  -7.854003906250007  -4.712402343750020

  Columns 3 through 4

  -1.570800781250019   1.570800781249981

  Columns 5 through 6

   4.712402343749982   7.854003906249970

>>
```

```
%RootFinding. problem 1
close all;clear all;clc;
f=inline('1-exp(x)+(sin(x))^2');
xup=input('upper value=' );
xlow=input('lower value=' );
tol=input('tolerance=' );
root=roots_bisec(f,xup,xlow,tol)
```

```
function [ r ] = roots_bisec( f,x,y,xt )
for i=1:1000
  if y+.1<x
    xu(i)=y+.1;
    x1(i)=y;
    y=y+.1;
  else
     xu(i)=x;
     x1(i)=y;
   break
  end
end
p=0;
for i=1:length(xu)
    xm=xu(i)-((xu(i)-x1(i))/(f(xu(i))-f(x1(i))))*f(xu(i));
    if f(xu(i))*f(x1(i))<0
    p=p+1;
    while (abs(f(xm))>xt)
    xm=xu(i)-((xu(i)-x1(i))/(f(xu(i))-f(x1(i))))*f(xu(i));
       if f(x1(i))*f(xm)>0
         x1(i)=xm;
       else
         xu(i)=xm;
        end
     end
    r(p)=xm;
    p=p+1;
   end
end
end
```

```
upper value=10
lower value=-10
tolerance=.0001

root =

    9.020562075079397e-16

>>
```

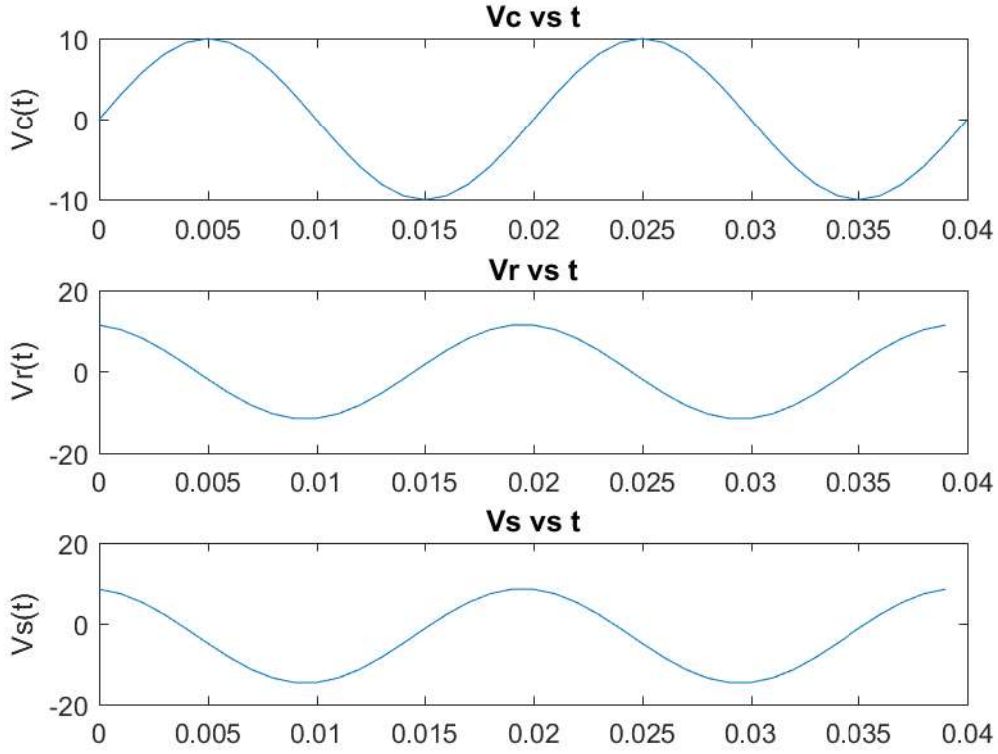
```
%differentiation/intregation.. local and global maxima_minima
%problem 1 & 2
close all; clear all; clc;
f=inline('5*cos(10.*x)+x.^3-2.*x.^2-6.*x+10');
h = .001;l = 0:h:4;
for i=1:length(l)-1
    y(i)=(f(l(i)+h)-f(l(i)))./h;
end
maxmin = f(l(find(abs(y)<.11)))
format long g
global_maxima = max(maxmin)
global_minima = min(maxmin)
subplot(2,1,1)
plot(l,f(l),'b');
subplot(2,1,2)
plot(l(1:length(l)-1),y,'b')
```


20
10
0
-10
0
0.5
1
1.5
2
2.5
3
3.5
4
100
50
0
-50
-100
0
0.5
1
1.5
2
2.5
3
3.5
4

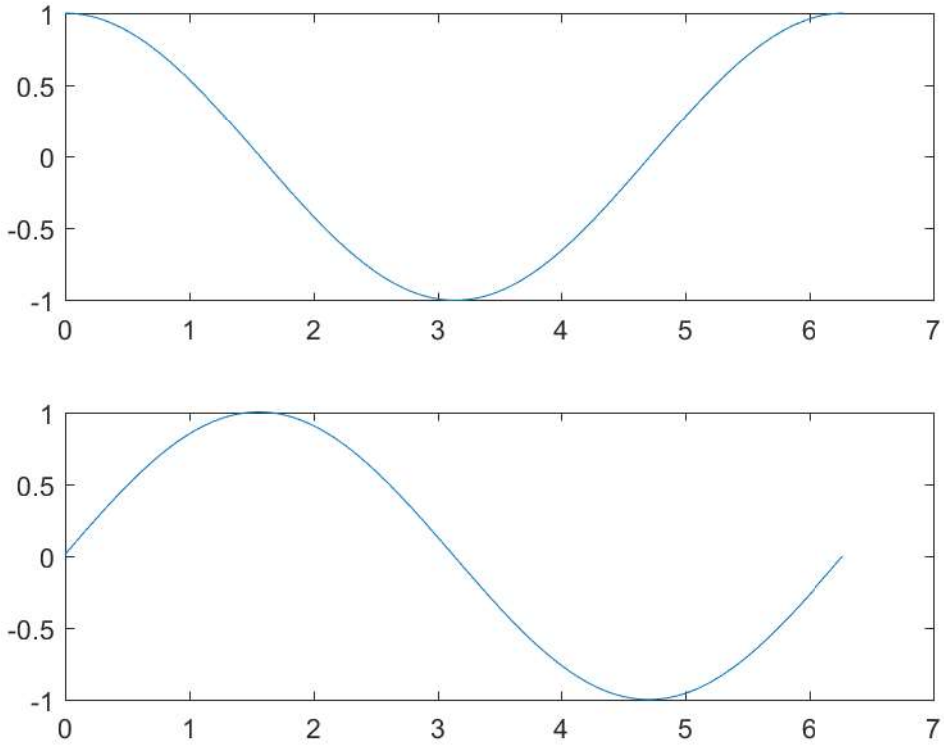
```
maxmin =

  Column 1

        10.7422586783169

  Column 2

        -1.64450629624634

  Column 3

        -5.50732604436644

  Column 4

        -7.2317121029383

  Column 5

        -5.39321667773724

  Column 6

         7.5436849673891

  Column 7

        18.0266197388984
```

```
global_maxima =

    18.0266197388984


global_minima =

    -7.2317121029383

>>
```

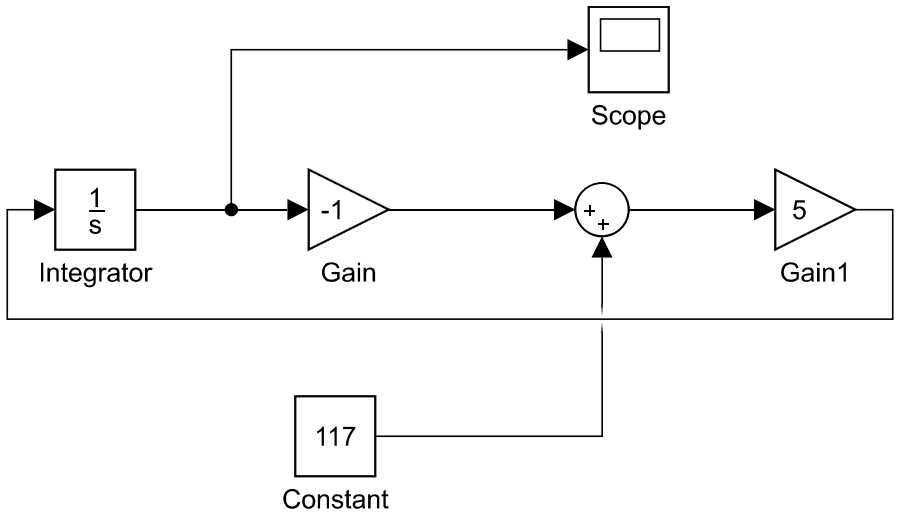
```
%problem 4. rc circuit problem.. differentiation
close all; clear all; clc;
f=inline('10*sin(100*pi*t)');
h = .001;
t = 0:h:.04;
for i=1:length(t)-1
    y(i)=(f(t(i)+h)-f(t(i)))./h;
end
figure
subplot(3,1,1)
plot(t,f(t)),ylabel('Vc(t)')
title('Vc vs t')
subplot(3,1,2)
plot(t(1:length(t)-1),y.*0.003736),ylabel('Vr(t)')
title('Vr vs t')
subplot(3,1,3)
plot(t(1:length(t)-1),(y.*0.003736+f(t(length(t)-1)))),ylabel('Vs(t)')
title('Vs vs t')
```

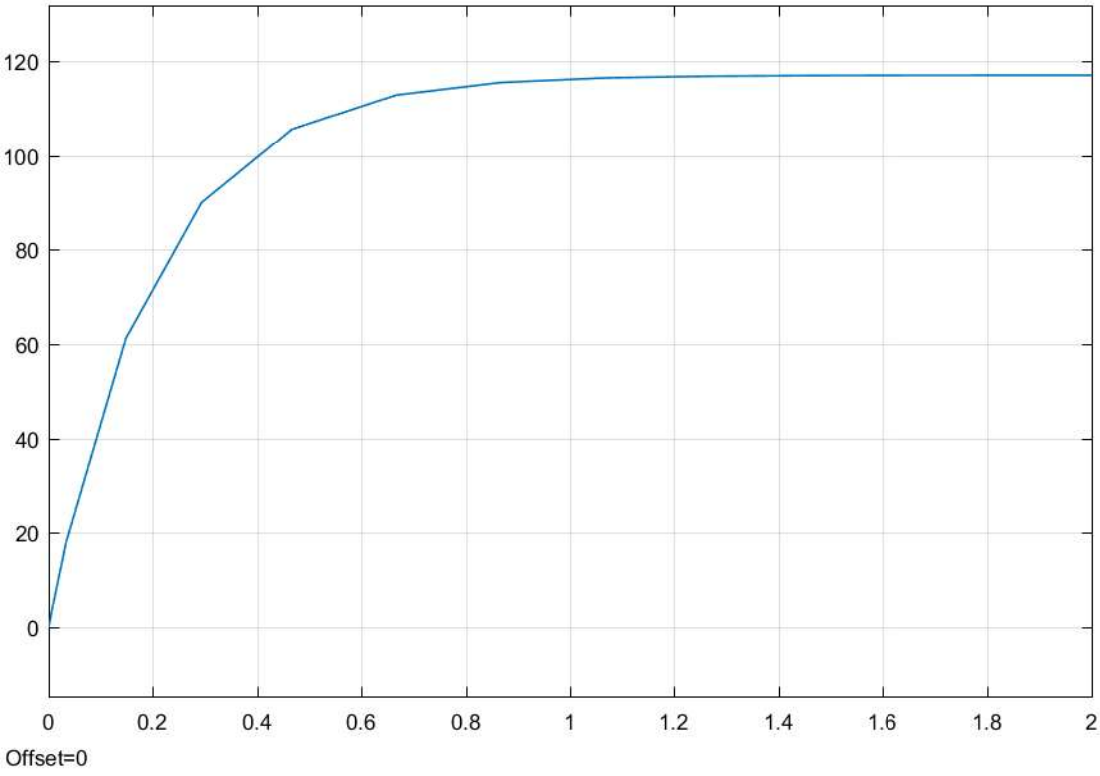

Vc vs t
Vc(t)
10
0
-10
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
Vr vs t
Vr(t)
20
0
-20
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
Vs vs t
Vs(t)
20
0
-20
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04

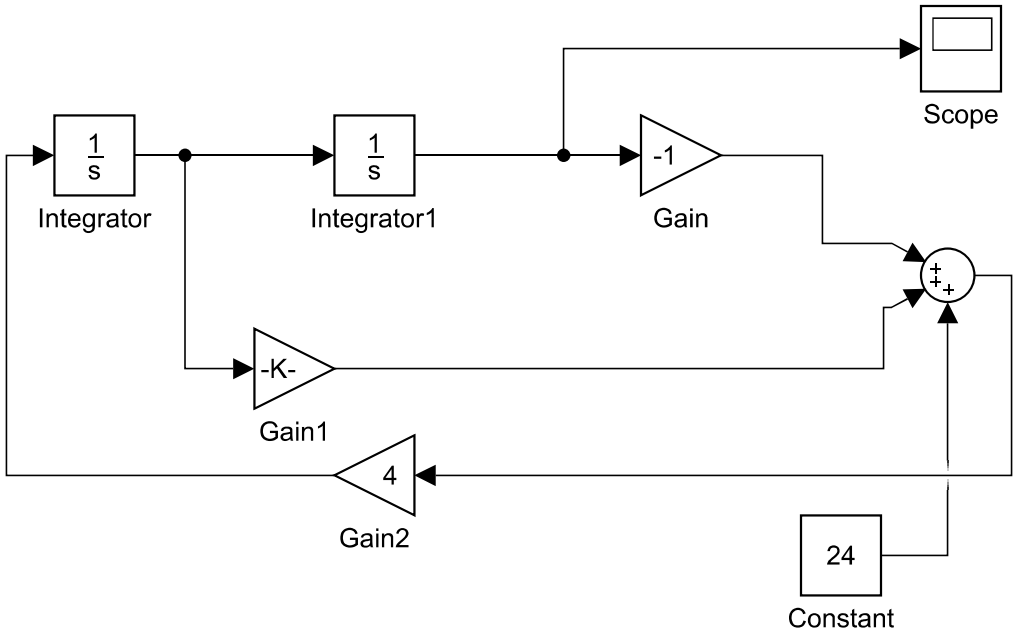
```
clc; clear all; close all;
h=0.01;%step size
x=0:h:2*pi;
f=@(x) cos(x);
y=f(x);
int_y=0; %initialization
for i=1:length(x)-1
 int_y=int_y+ (y(i)+y(i+1))/2*h;
in(i) = int_y;
end
subplot(2,1,1)
plot(x,f(x))
subplot(2,1,2)
plot(x(1:length(x)-1),in)
```

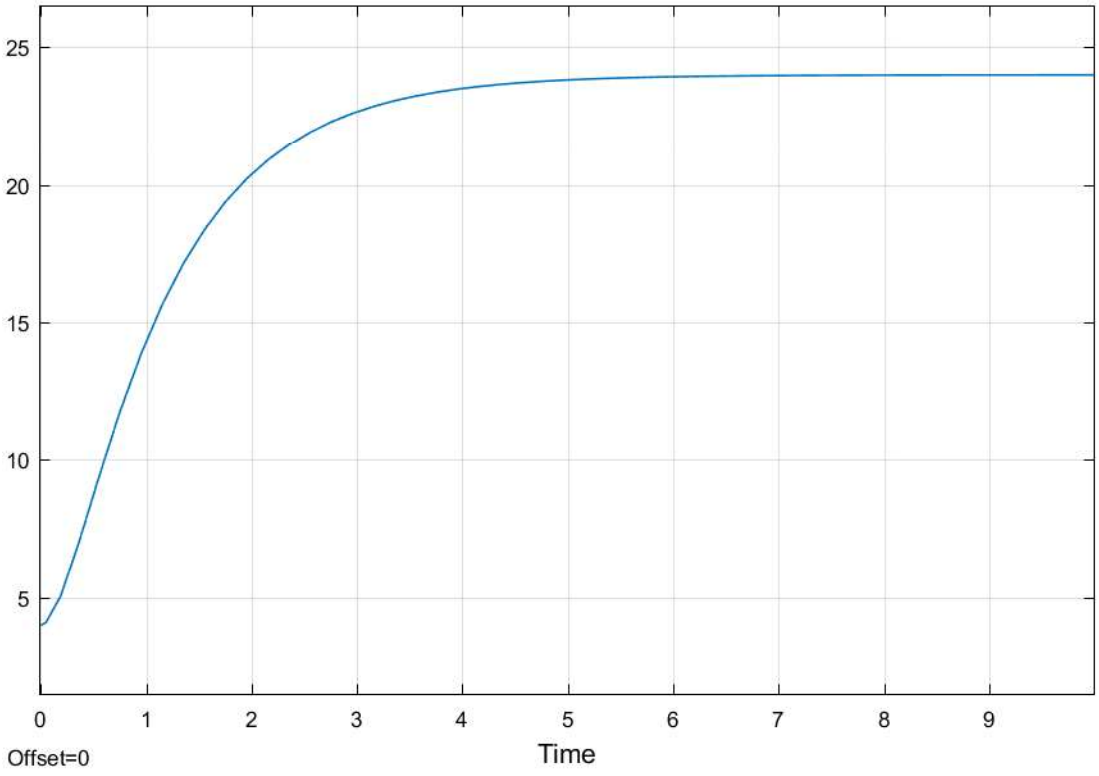

1
0.5
0
-0.5
-1
0
1
2
3
4
5
6
7
1
0.5
0
-0.5
-1
0
1
2
3
4
5
6
7

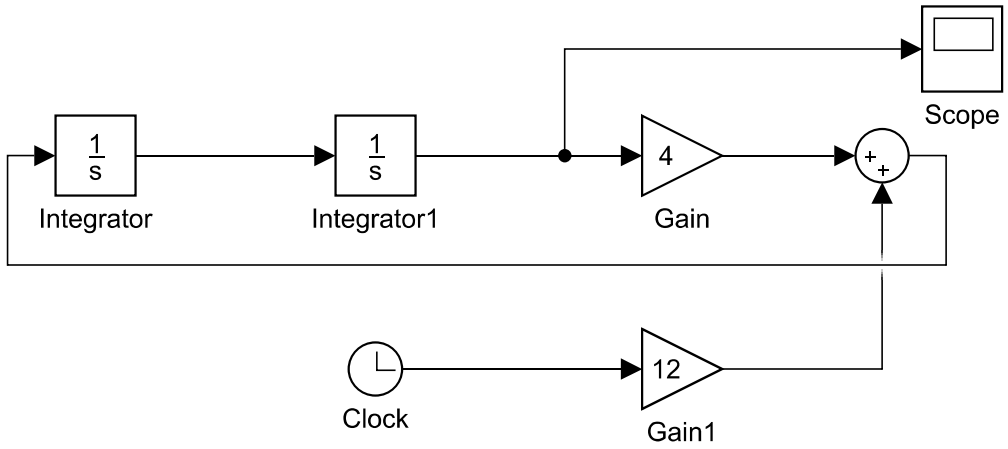
```
clc; clear all; close all;
f =inline('(24-5*.25*v)/0.25','t','vc','v');
h = .01;
t = 0:h:2; v(1) = 0.01;
for i=1:length(t)-2
    v(i+1)=v(i)+f(t(i),v(i))*h;
end
plot(t,vc),xlabel('Time'),ylabel('vs');
```

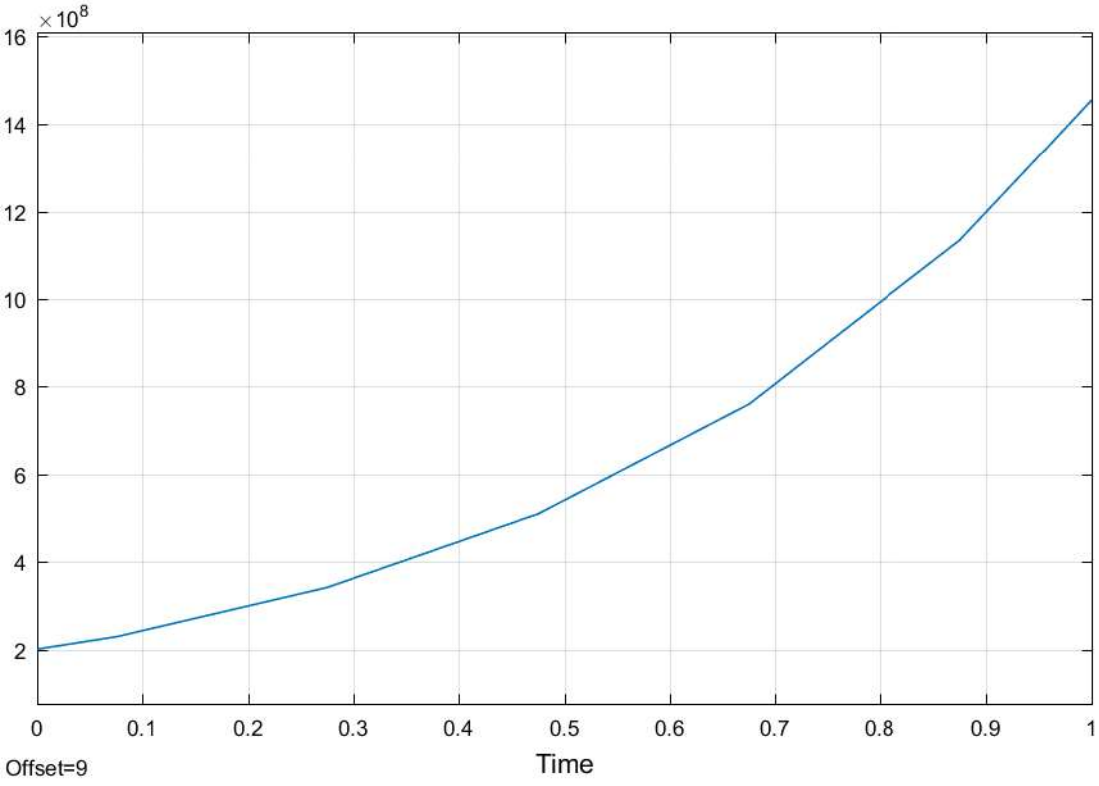

Scope
1
s
Integrator
-1
Gain
+
+
5
Gain1
117
Constant


120
100
80
60
40
20
0
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
Offset=0


Scope
1
s
Integrator
1
s
Integrator1
-1
Gain
-K-
Gain1
4
Gain2
24
Constant


25
20
15
10
5
0
1
2
3
4
5
6
7
8
9
Time
Offset=0


1
s
Integrator
1
s
Integrator1
4
Gain
Scope
Clock
12
Gain1


×10^8
16
14
12
10
8
6
4
2
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Time
Offset=9