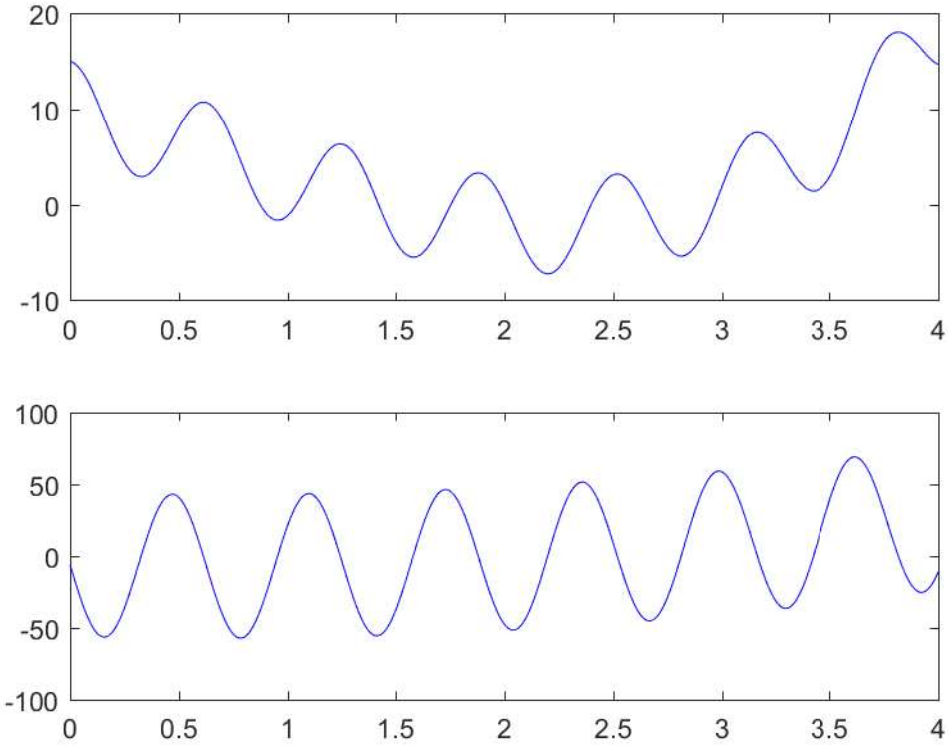
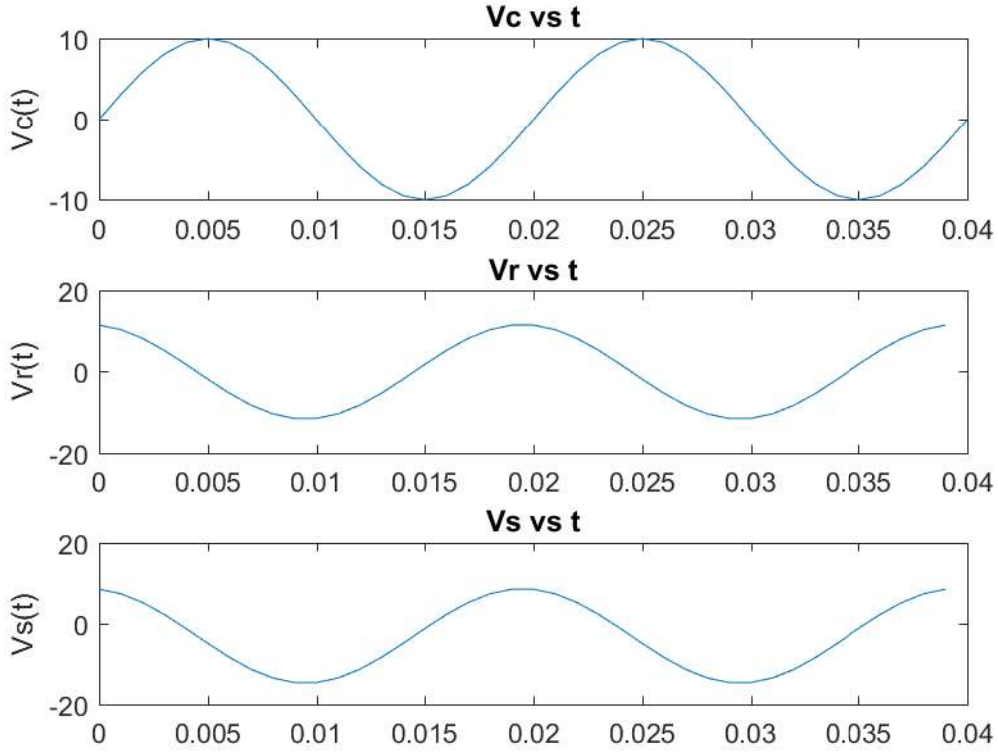
```
%differentiation/intregation.. local and global maxima_minima
%problem 1 & 2
close all; clear all; clc;
f=inline('5*cos(10.*x)+x.^3-2.*x.^2-6.*x+10');
h = .001;l = 0:h:4;
for i=1:length(l)-1
    y(i)=(f(l(i)+h)-f(l(i)))./h;
end
maxmin = f(l(find(abs(y)<.11)))
format long g
global_maxima = max(maxmin)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

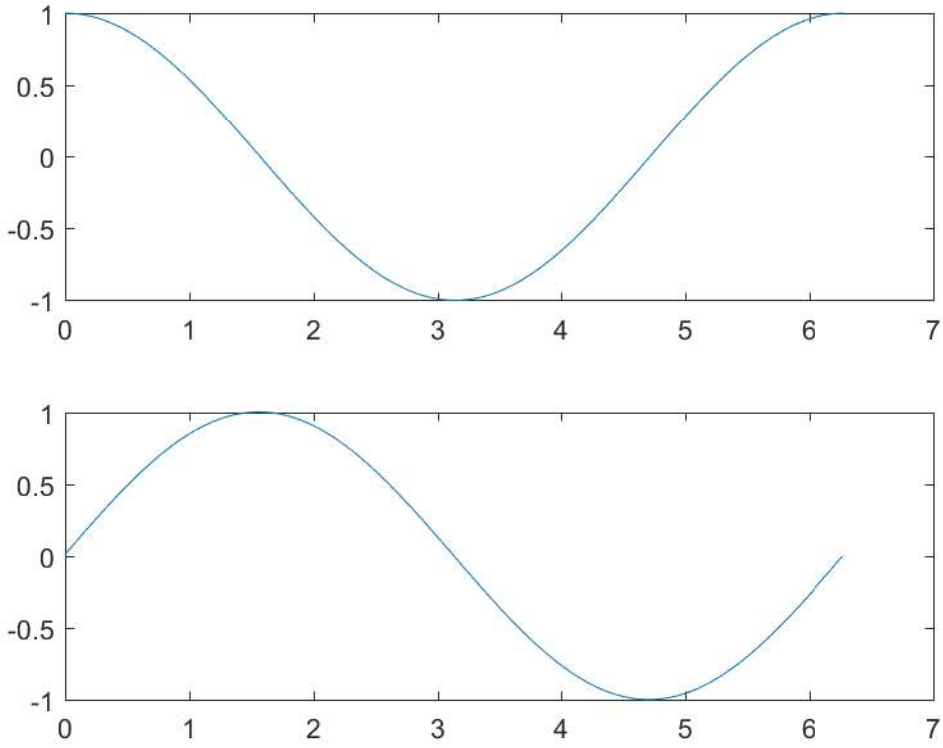
```
maxmin =

  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

>>
```

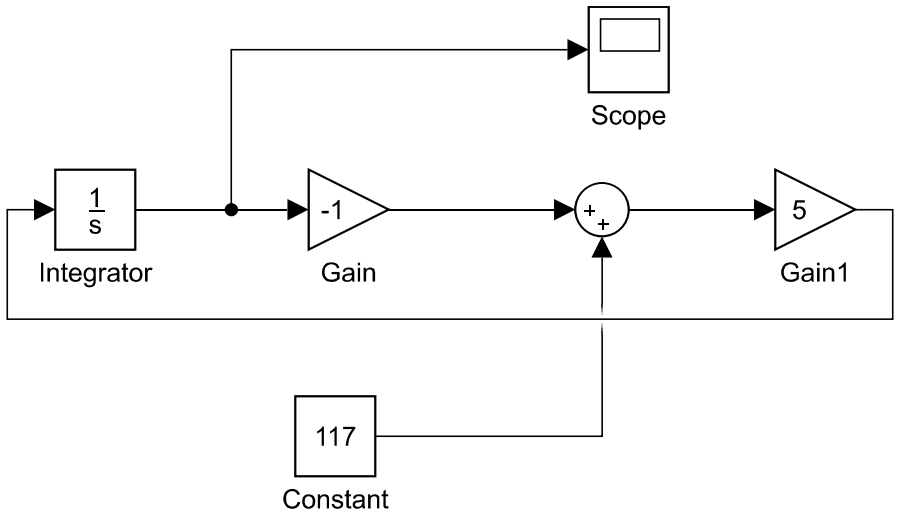
```
%problem 4. rc circuit problem.. differentiation
close all; clear all; clc;
f=inline('10*sin(100*pi*t)');
h = .001;
t = 0:h:.04;
for i=1:length(t)-1
    y(i)=(f(t(i)+h)-f(t(i)))./h;
end
figure
subplot(3,1,1)
plot(t,f(t)),ylabel('Vc(t)')
title('Vc vs t')
subplot(3,1,2)
plot(t(1:length(t)-1),y.*0.003736),ylabel('Vr(t)')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

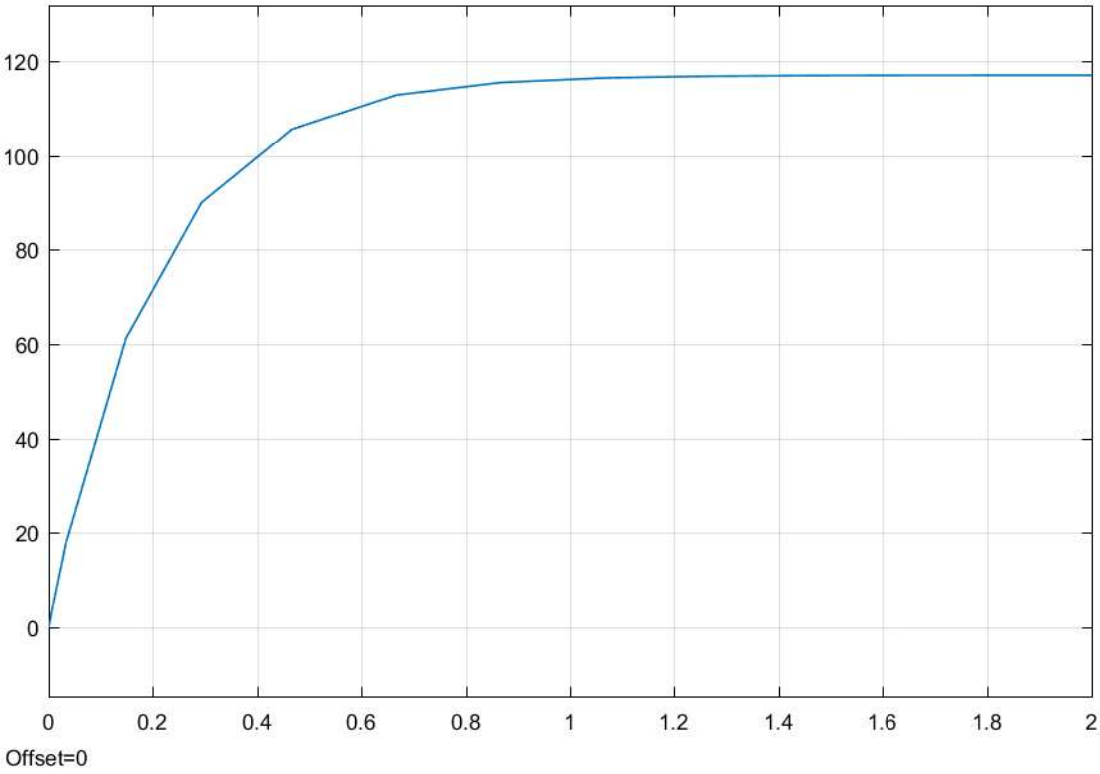

Vc vs t
Vc(t)
10
0
-10
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
Vr vs t
Vr(t)
20
0
-20
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04
Vs vs t
Vs(t)
20
0
-20
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
0.04

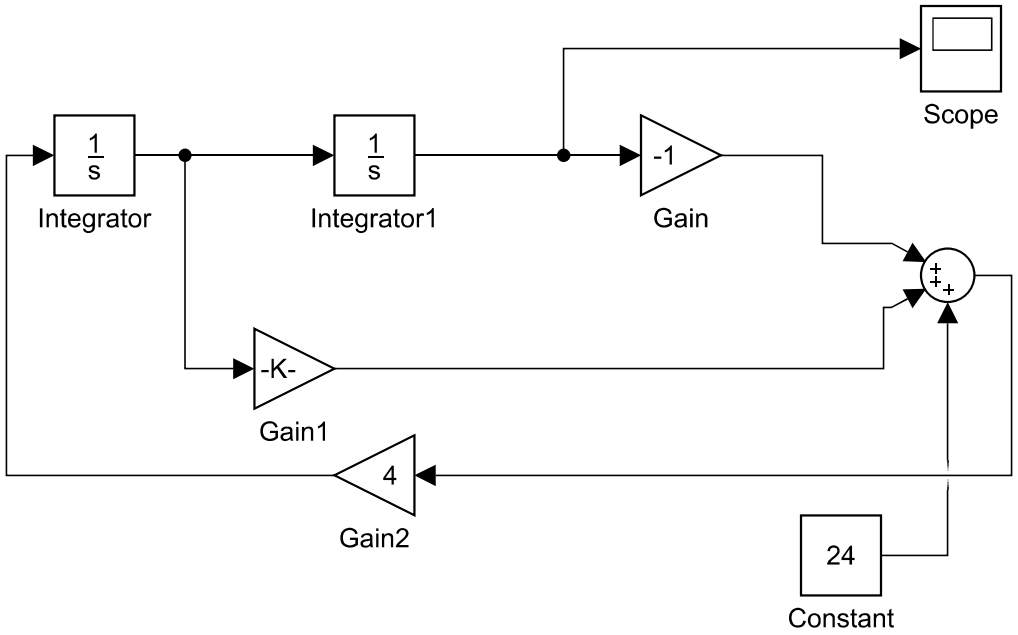
```
clc; clear all; close all;
h=0.01;%step size
x=0:h:2*pi;
f=@(x) cos(x);
y=f(x);
int_y=0; %initialization
for i=1:length(x)-1
 int_y=int_y+ (y(i)+y(i+1))/2*h;
in(i) = int_y;
end
subplot(2,1,1)
plot(x,f(x))
subplot(2,1,2)
plot(x(1:length(x)-1),in)
```

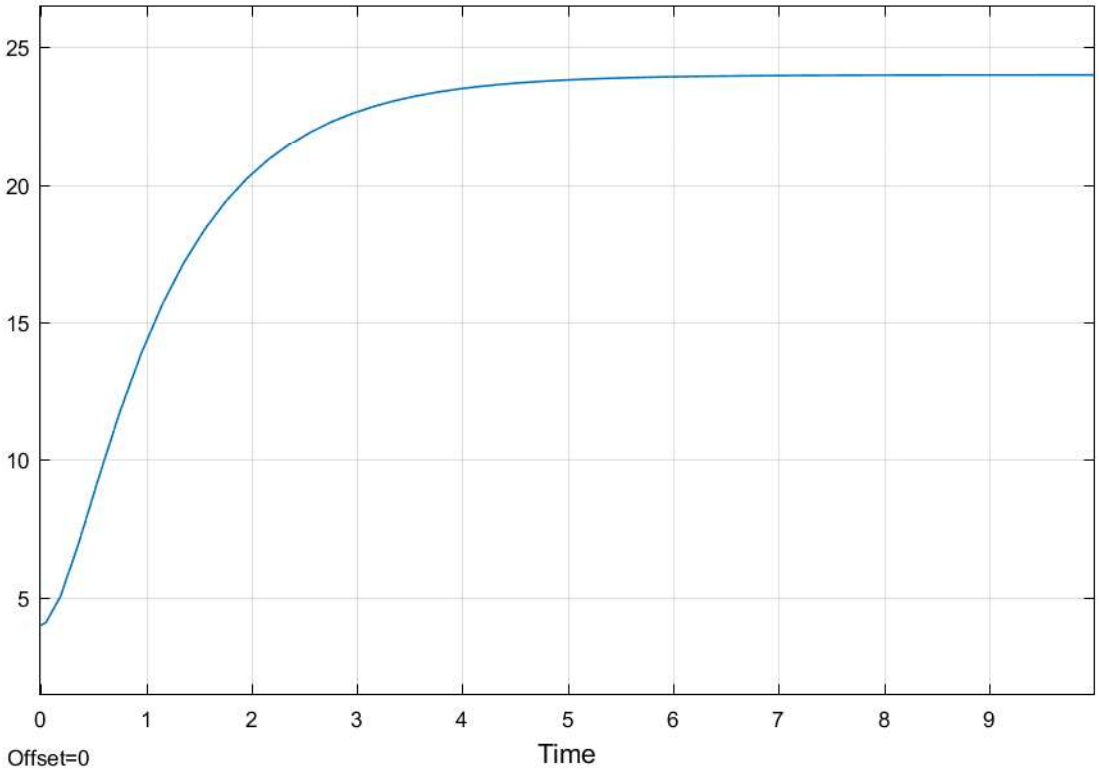

1
0.5
0
-0.5
-1
0
1
2
3
4
5
6
7
1
0.5
0
-0.5
-1
0
1
2
3
4
5
6
7

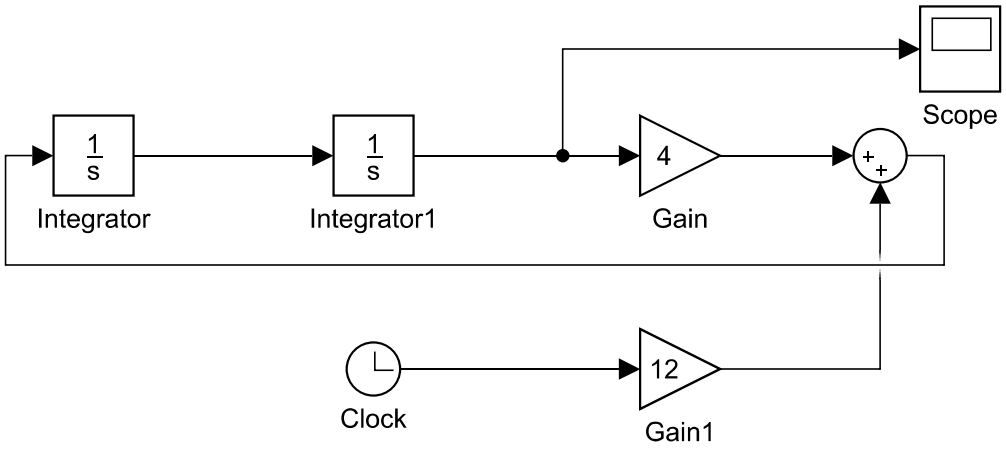
```
clc; clear all; close all;
f =inline('(24-5*.25*v)/0.25','t','vc','v');
h = .01;
t = 0:h:2; v(1) = 0.01;
for i=1:length(t)-2
    v(i+1)=v(i)+f(t(i),v(i))*h;
end
plot(t,vc),xlabel('Time'),ylabel('vs');
```

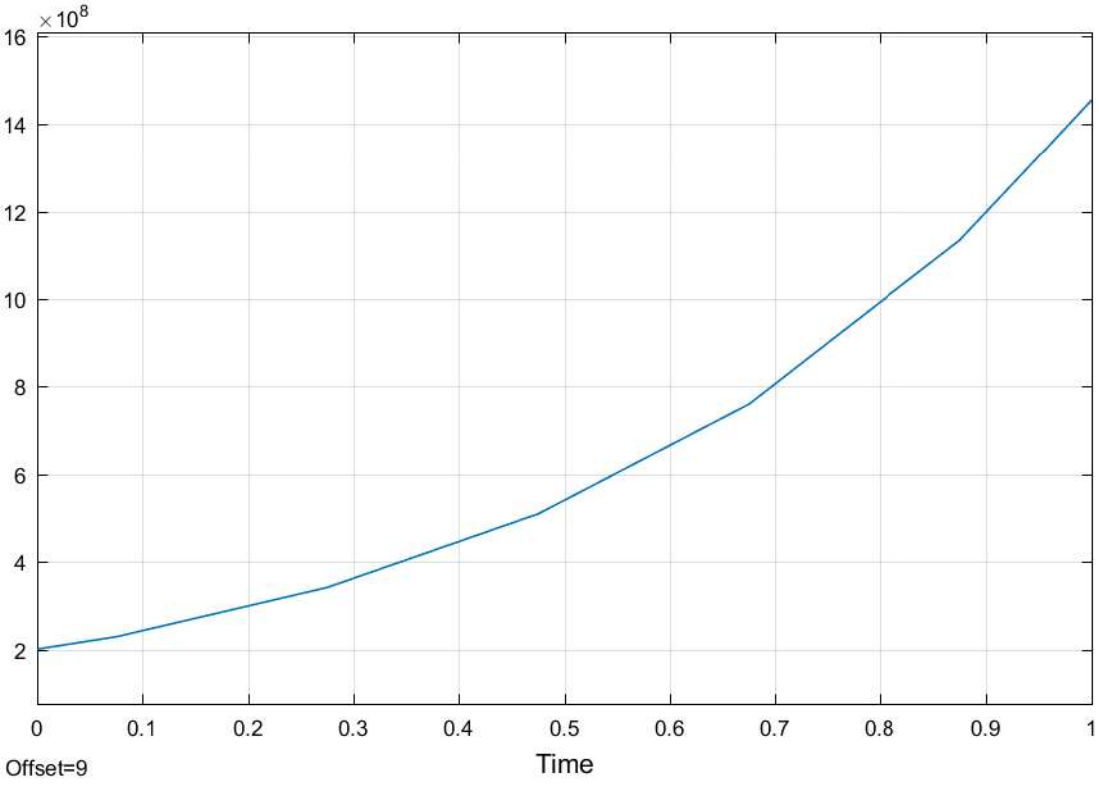

Scope
1
s
Integrator
-1
Gain
+
+
5
Gain1
117
Constant


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