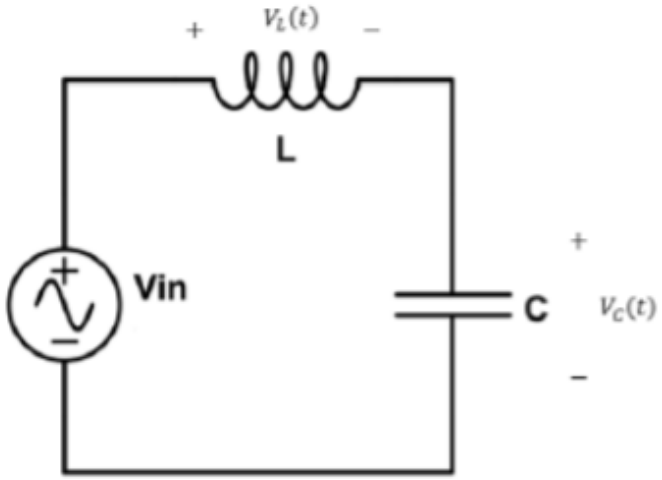
SIS3P_Assignment1

1. MATLAB Introduction

Theorie recap question:



Given the LC circuit with a voltage source above. Consider the dynamical system with input $V_{in}(t)$ and output $V_c(t)$.

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Group number was not given

a) $V_{in} = V_L + V_C$

$V_L = \frac{di_L}{dt}$

$i_L = i_C(t) = C\frac{dv_c}{dt}$

$V_{in} = L \cdot C \cdot \frac{d(\frac{dv_c}{dt})}{dt} = L \cdot C \cdot \ddot{v}$

$V_{in} = L \cdot C \cdot \ddot{v}_c + V_c$

b) Second order system

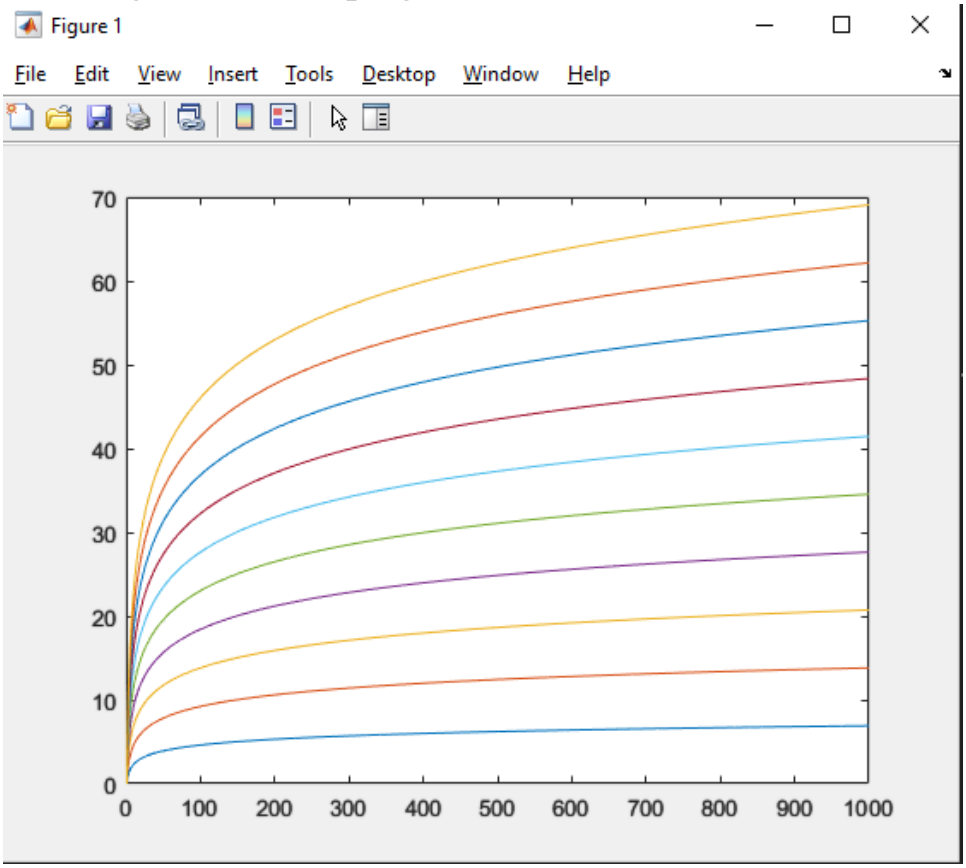
c) $V_{in}(j\omega) = L \cdot C \cdot j^2 \cdot \omega^2 \cdot V_c(j\omega) + V_c(j\omega)$

$H(j\omega) = \frac{V_c(j\omega)}{V_{in}(j\omega)} = \frac{V_c(j\omega)}{LC \cdot j^2\omega^2 V_c(j\omega) + V_c(j\omega)} =$

$= \frac{1}{1 + L(j\omega)^2} = \frac{1}{1 - L \cdot C \cdot \omega^2}$

MATLAB Tutorials

1.Writing a MATLAB program




```
function y=Tutorial1(maxLoop)
x=(1:1000)'; %column vector
for k=1:maxLoop
        y(:,k)=k*log(x);
end
plot(x,y)
```

2.Working with arrays

```
a = [1 2 3 4]
a = [1 2 ; 3 4]
a = 1:10
a = 1:2:10
a = 10:-2:1
a = linspace(1,20,7)
a = linspace(1,20,7)'
a = rand(6,4)
a(1,2)
a(1,[1 2])
a(1,[1 3])
a(1, :)
a(1,2:end)
a(1,2:end-1)
a(1,2:end-1) = [10 10]
a(1:2,:) = [];
a(5)
a(:)
a < 0.5
a(a < 0.5) = -1
ind = find (a < 0.5)
[r,c] = find (a < 0.5)
numel(a)
b = [a a]
b = [a ; a]
```

3.Functions

```
function out=tutorial3(in)
%test function bruv
intermediate=in+1
out=intermediate*10;
```

4. For-Loops

```
for loop_index=vector
    code;
end

for ii = 1:10
  ii
end

a= -5:5;
for ii = 1:length(a)
    a(ii)
end

a = 1:10;
sum_a = 0;
for ii = 1:2:length(a)
    sum_a = sum_a + a(ii)
end
disp(sum_a)

a = 1:10
ind = [1 4 9 3];
sum_a = 0;
for ii = ind
    sum_a = sum_a + a(ii)
end
disp(sum_a)

a = 20:54;
sum_vec = zeros (1, length(a));
sum_a = 0
for ii = 1:length(a)
    sum_a = sum_a + a(ii);
    sum_vec(ii) = sum_a;
end
figure; plot(sum_vec )

bal = 1000;
num_years = 30;
bal_vec = zeros(1, num_years);
for year = 1:num_years
    bal = 1.08 *bal;
    bal_vec(year) = bal;
end
figure;plot(bal_vec)
```

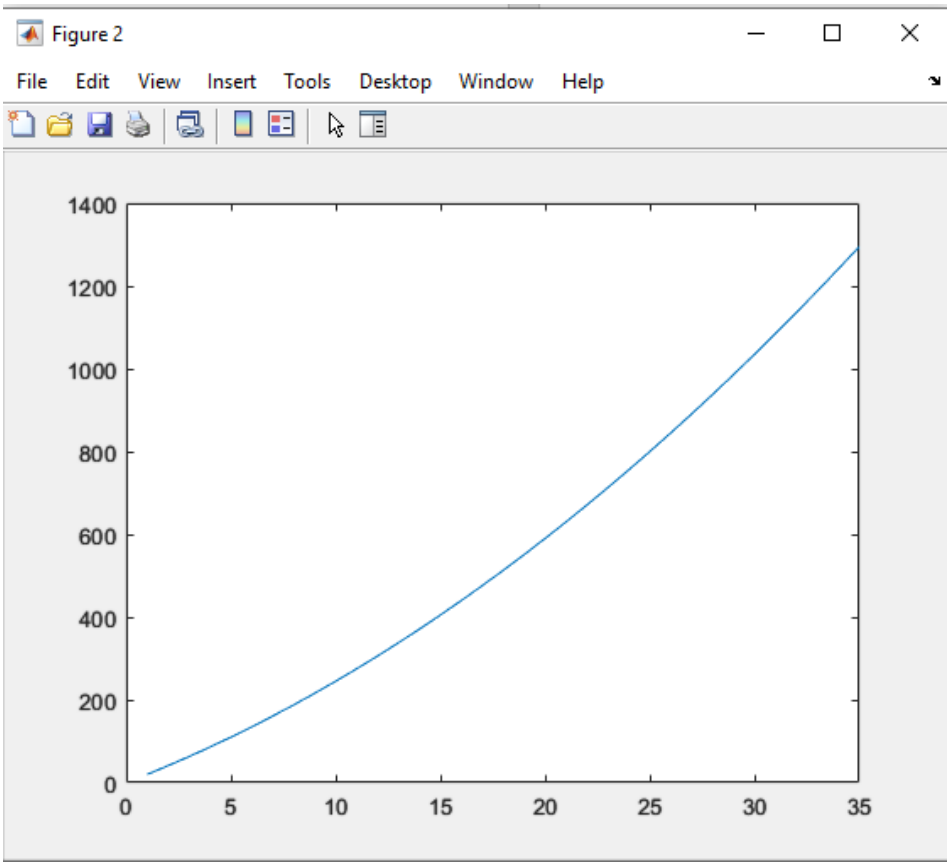


Figure 2
File Edit View Insert Tools Desktop Window Help
1400
1200
1000
800
600
400
200
0
0 5 10 15 20 25 30 35

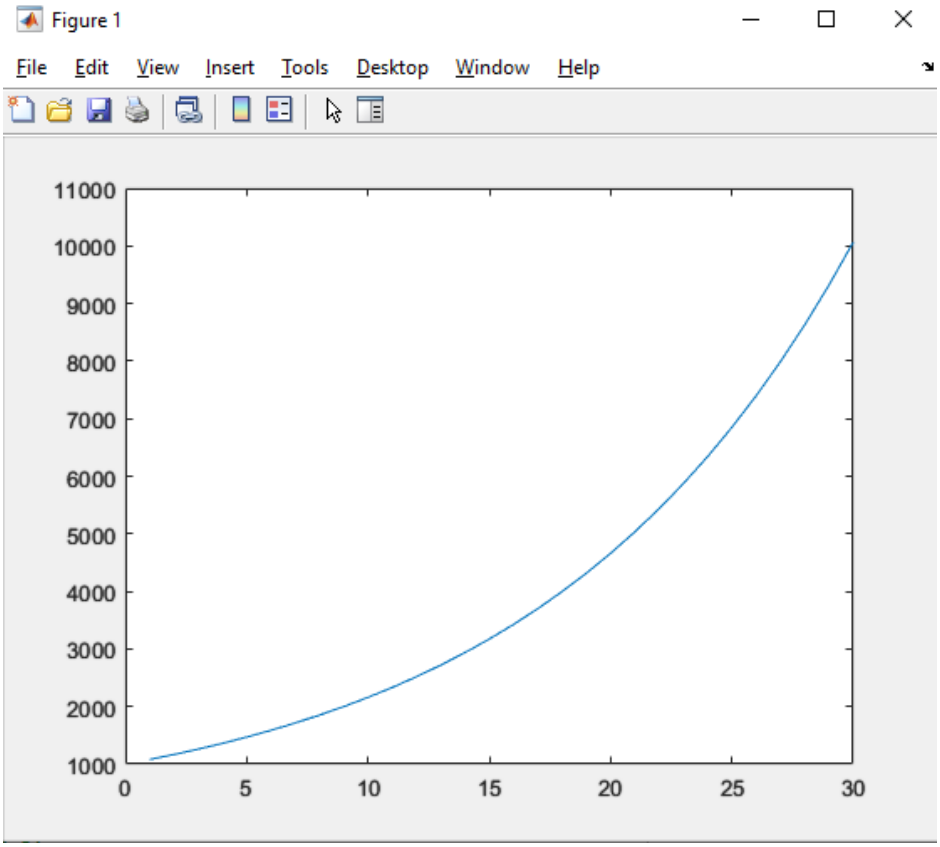


Figure 1
File Edit View Insert Tools Desktop Window Help
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0 5 10 15 20 25 30