Benha University
Faculty of Engineering at Shoubra

Electrical Engineering and Control (EEC) Department,
EEC380: Industrial Training (1)
Summer 2020

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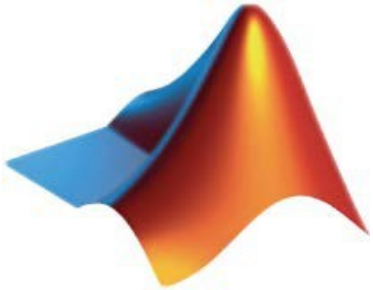

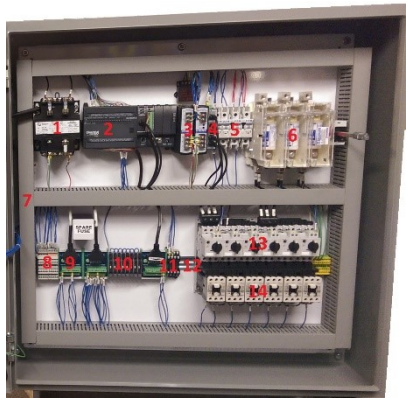

MATLAB **Industrial Control**

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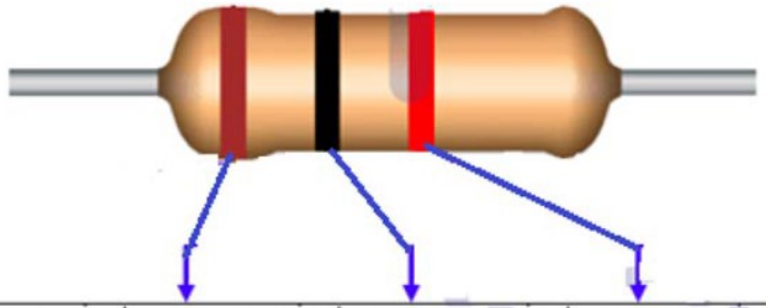
Dr. Islam Mohamed

Outline

- Assignment#2 Solution.
- Plotting.
- Quiz#1
- Function.

Assignment#2 Solution

Problem (1):



1000Ω

COLOR	1st DIGIT	2nd DIGIT	3rd DIGIT
BLACK	0	0	0
BROWN	1	1	1
RED	2	2	2

Fig.1

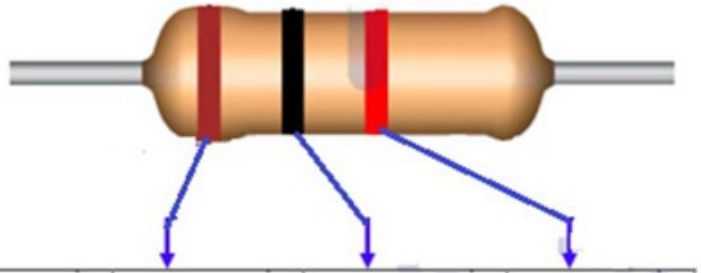
Example: If the user input is (Brown, Black, Red), then C1=1, C2=0, and C3=2. Hence, the resistor value will be $R = C1C2 \times 10^{C3}\ \Omega$ i.e. $R = 10 \times 10^{2} = 1000\ \Omega$.

Solution:

```
clear,clc;
C1=input('Enter the resistor first left color =  ','s');
C2=input('Enter the resistor first left color =  ','s');
C3=input('Enter the resistor first left color =  ','s');
```

Assignment#2 Solution

Problem (1):



1000Ω

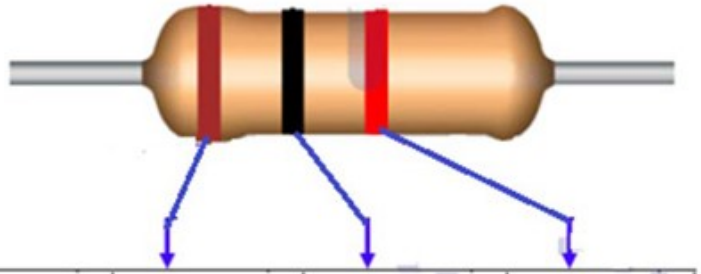
COLOR	1st DIGIT	2nd DIGIT	3rd DIGIT
BLACK	0	0	0
BROWN	1	1	1
RED	2	2	2

Solution:

```
if strcmpi(C1,'black')
    C1=0;
elseif strcmpi(C1,'brown')
    C1=1;
elseif strcmpi(C1,'red')
    C1=2;
end

if strcmpi(C2,'black')
    C2=0;
elseif strcmpi(C2,'brown')
    C2=1;
elseif strcmpi(C2,'red')
    C2=2;
end

if strcmpi(C3,'black')
    C3=0;
elseif strcmpi(C3,'brown')
    C3=1;
elseif strcmpi(C3,'red')
    C3=2;
end
```

Assignment#2 Solution

Problem (1):



1000Ω

COLOR	1st DIGIT	2nd DIGIT	3rd DIGIT
BLACK	0	0	0
BROWN	1	1	1
RED	2	2	2

Solution:

Example: If the user input is (Brown, Black, Red), then C1=1, C2=0, and C3=2. Hence, the resistor value will be $R = C1C2 \times 10^{C3}\ \Omega$ i.e. $R = 10 \times 10^{2} = 1000\ \Omega$.

```
R = (C1*10 + C2*1)*10^C3;
disp(['Resistor value =' num2str(R) ' Ohm'])
```

```
>> A1_P1
Enter the resistor first left color =  brown
Enter the resistor first left color =  black
Enter the resistor first left color =  red
Resistor value =1000 Ohm
```

Assignment#2 Solution

Problem (2):

Write a MATLAB program which will ask the user for two numbers K and L. Using the for loop find the sum of the squares of all numbers between K and L, that is

$$\sum_{j=k}^{l} j^2$$

Solution:

```
clear,clc;
K=input('Enter the first number (K) = ');
L=input('Enter the second number (L) where (L>K) = ');

sum=0;
for n=K:L
sum = sum +n^2;
end

disp(['The sum of numbered squred between K and L =' num2str(sum)])
```

```
Enter the first number (K) = 2
Enter the second number (L) where (L>K) = 4
The sum of numbered squred between K and L =29
```

Assignment#2 Solution

Problem (3):

Repeat the pervious program using the while loop.

Solution:

```
clear,clc;
K=input('Enter the first number (K) = ');
L=input('Enter the second number (L) where (L>K) = ');

sum=0;
while K <= L
sum = sum +K^2;
K=K+1;
end

disp(['The sum of numbered squred between K and L =' num2str(sum)])
```

```
Enter the first number (K) = 2
Enter the second number (L) where (L>K) = 4
The sum of numbered squred between K and L =29
```

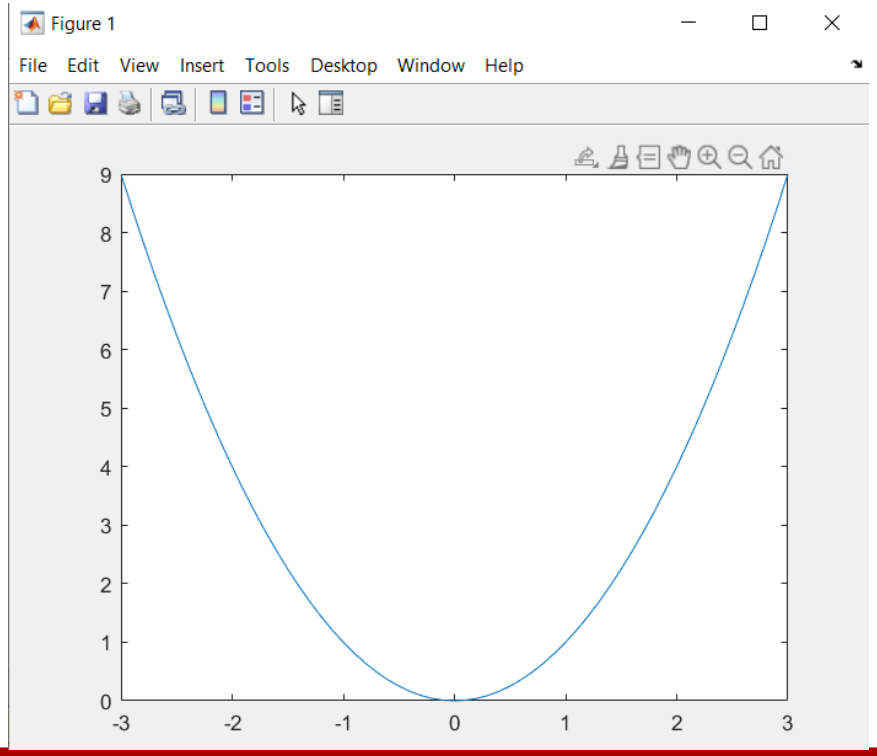
Plotting using MATLAB

2D-Plotting

```
>> help  plot
 plot   Linear plot.
    plot(X,Y) plots vector Y versus vector X. If X or Y is a matrix,
    then the vector is plotted versus the rows or columns of the matrix,
    whichever line up.  If X is a scalar and Y is a vector, disconnected
    line objects are created and plotted as discrete points vertically at
    X.
```

Example:

```
x = -3:0.1:3;
y = x.^2;

plot(x,y)
```



Plotting using MATLAB

plot(X,Y,S) where S is a character string made from one element from any or all the following 3 columns:

b	blue	.	point	-	solid
g	green	o	circle	:	dotted
r	red	x	x-mark	-.	dashdot
c	cyan	+	plus	--	dashed
m	magenta	*	star	(none)	no line
y	yellow	s	square		
k	black	d	diamond		
w	white	v	triangle (down)		
		^	triangle (up)		
		<	triangle (left)		
		>	triangle (right)		
		p	pentagram		
		h	hexagram		

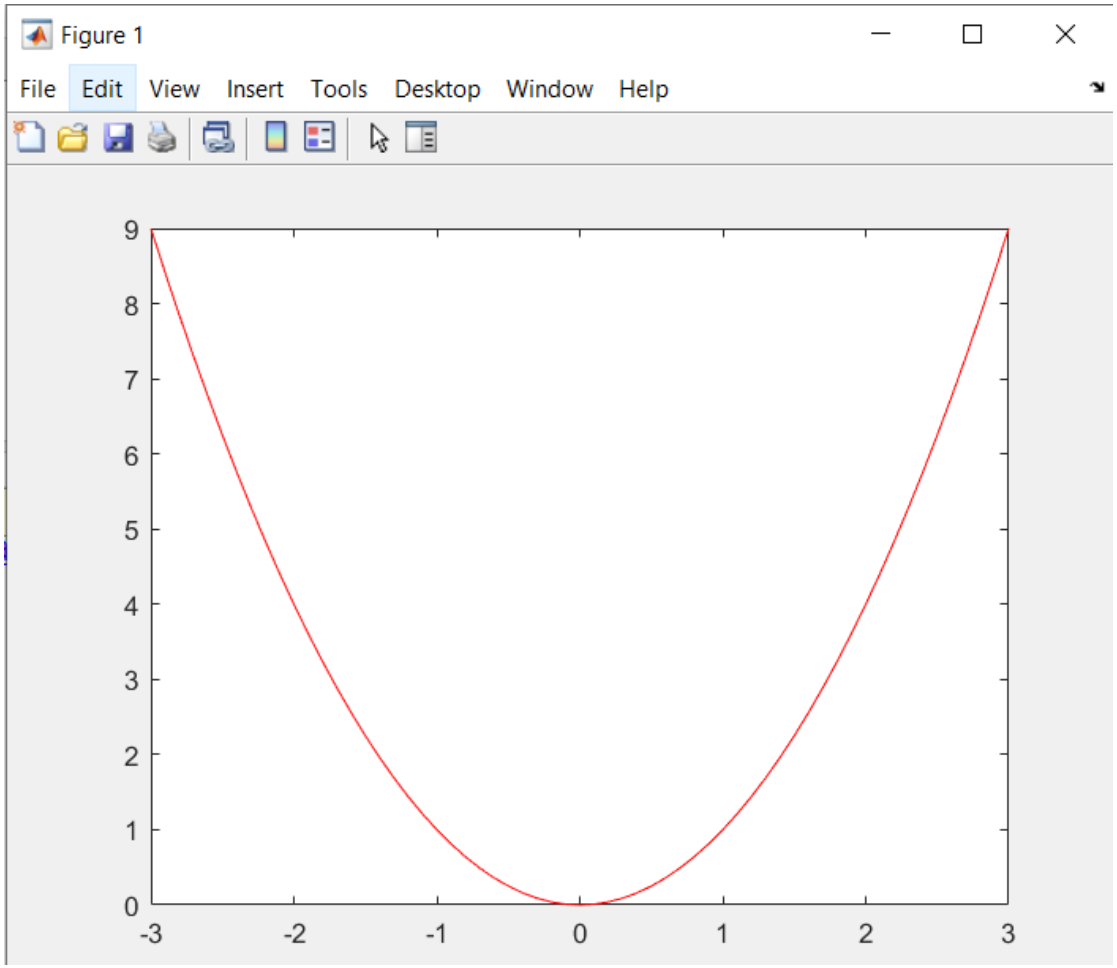
Example:

```
x = -3:0.1:3;
y = x.^2;
plot(x,y,'r')
```

Plotting using MATLAB

Example:

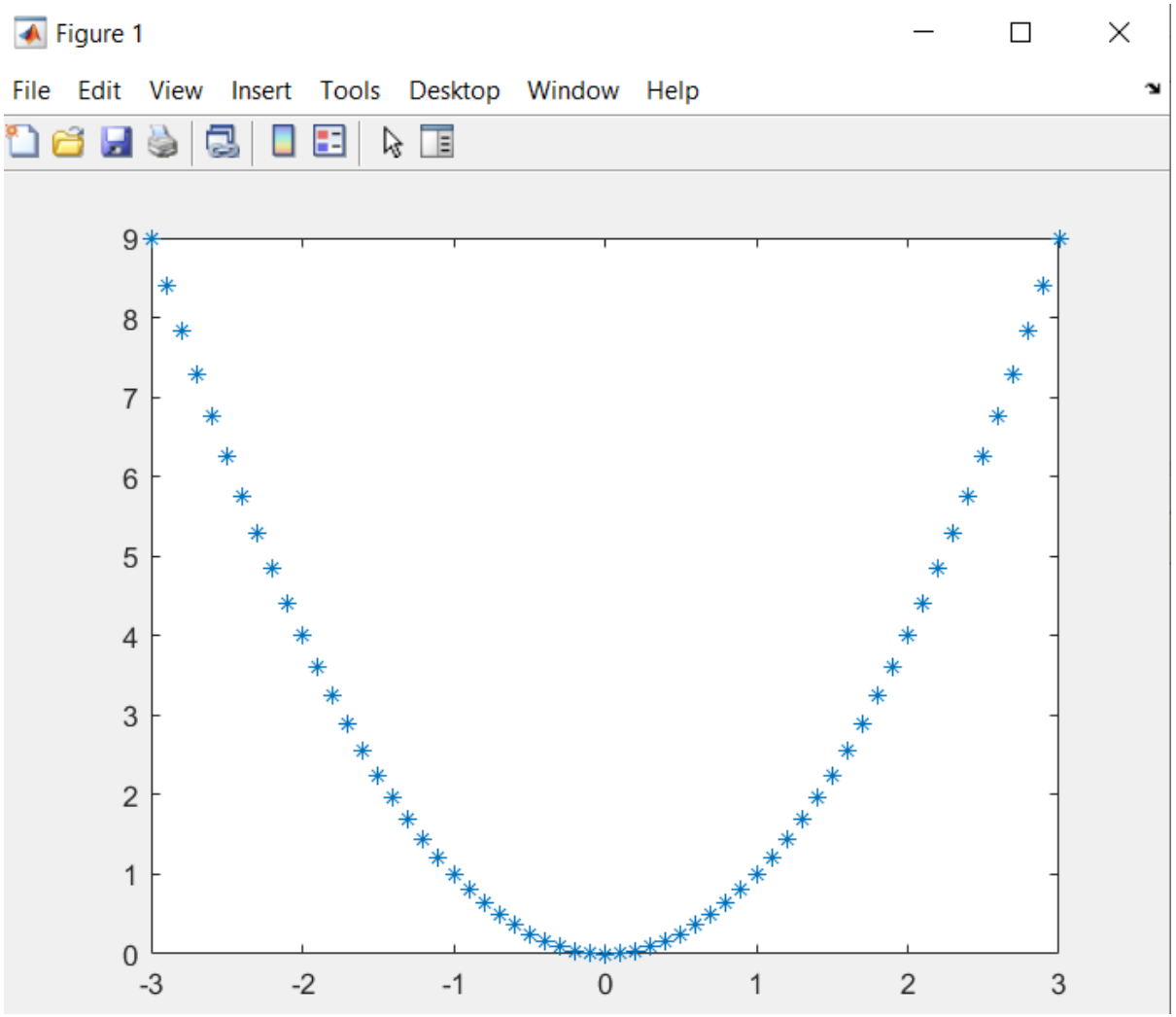
```
x = -3:0.1:3;
y = x.^2;
plot(x,y,'r')
```



Plotting using MATLAB

Example:

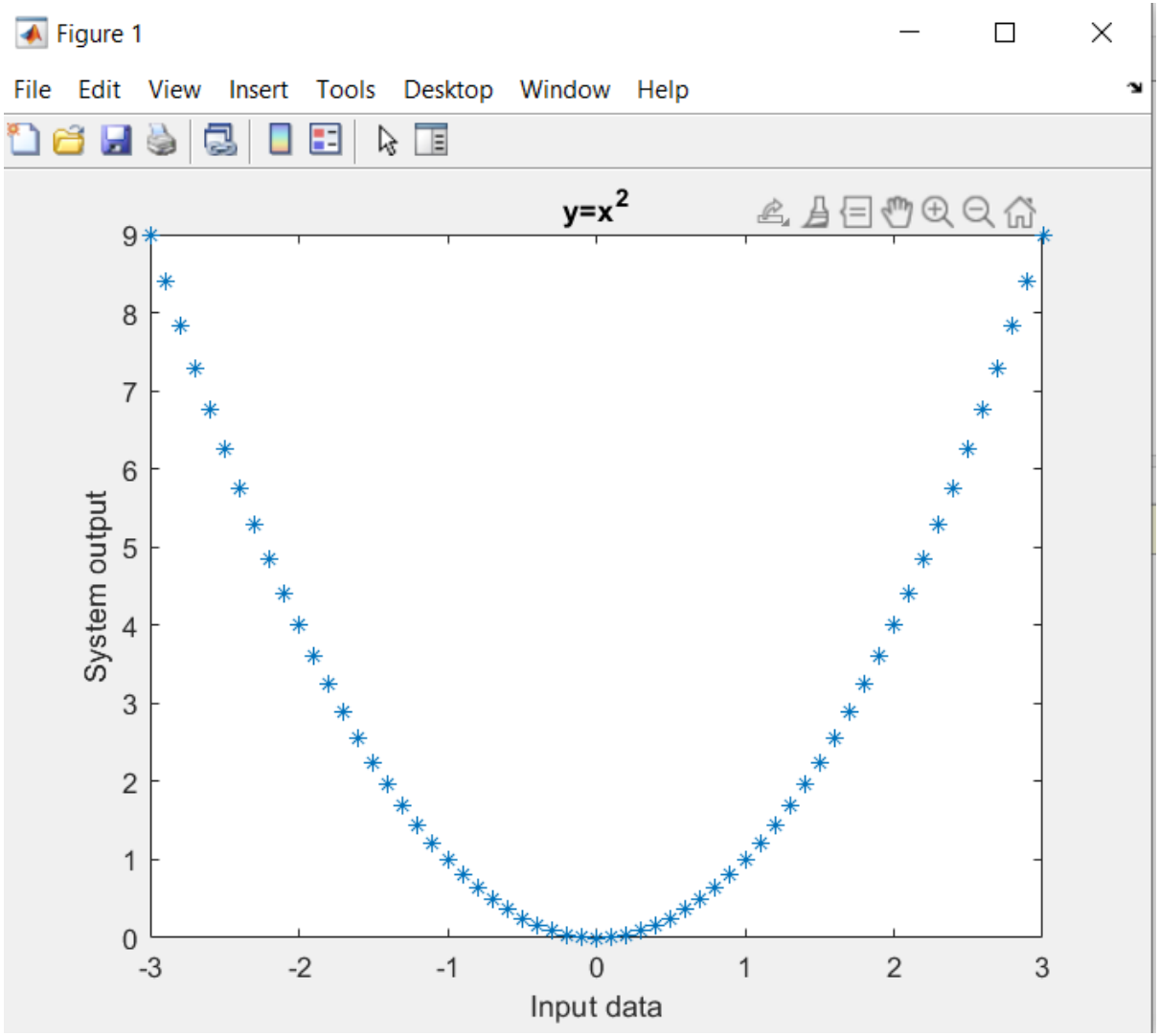
```
x = -3:0.1:3;
y = x.^2;

plot(x,y,'*')
```



Plotting using MATLAB

Example:

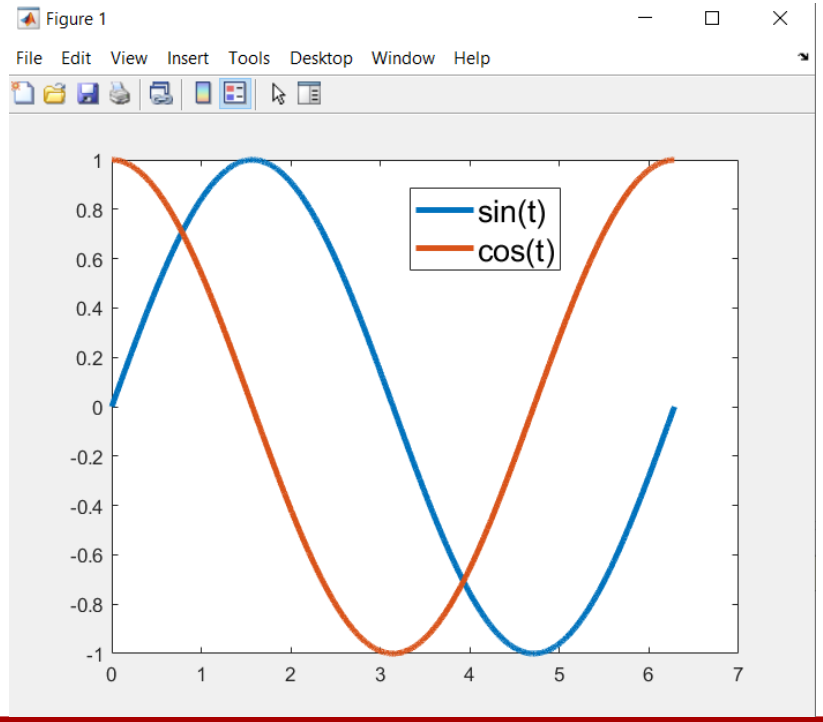
```
x = -3:0.1:3;
y = x.^2;

plot(x,y,'*')

xlabel('Input data')
ylabel('System output')

title('y = x^2')
```



Plotting using MATLAB

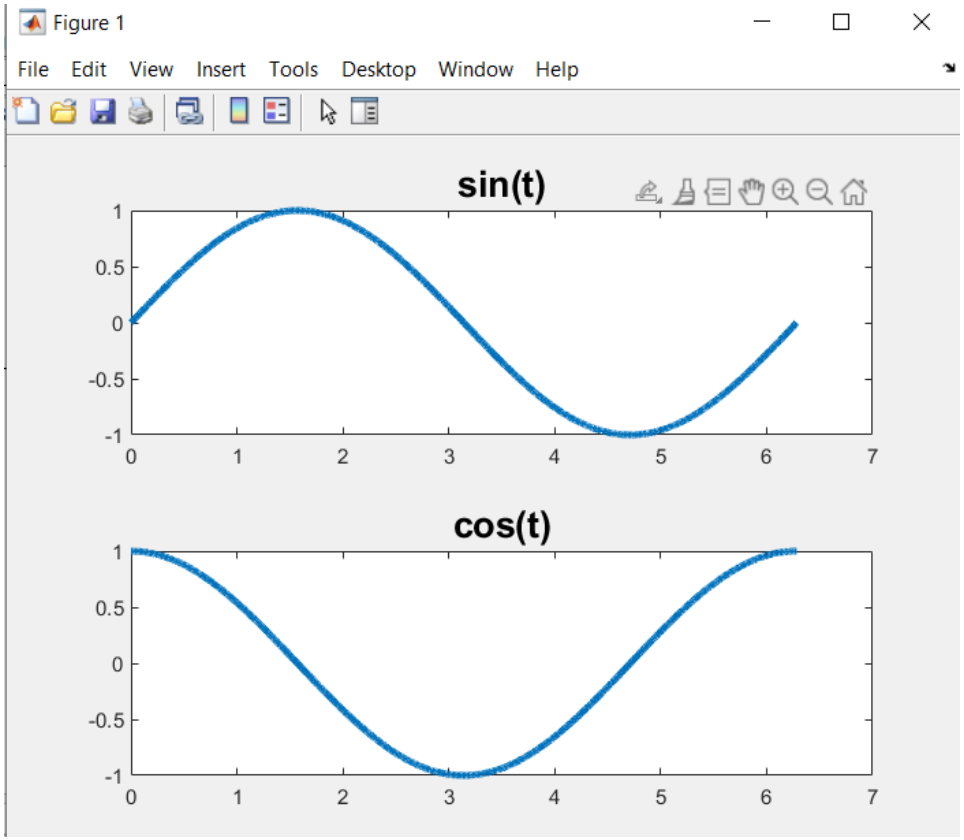
```
hold on

legend
```

```
t=0:0.001:2*pi;
plot(t,sin(t),'LineWidth',3)

hold on
plot(t,cos(t),'LineWidth',3)

legend('sin(t)','cos(t)','FontSize',16)
```



Plotting using MATLAB

subplot

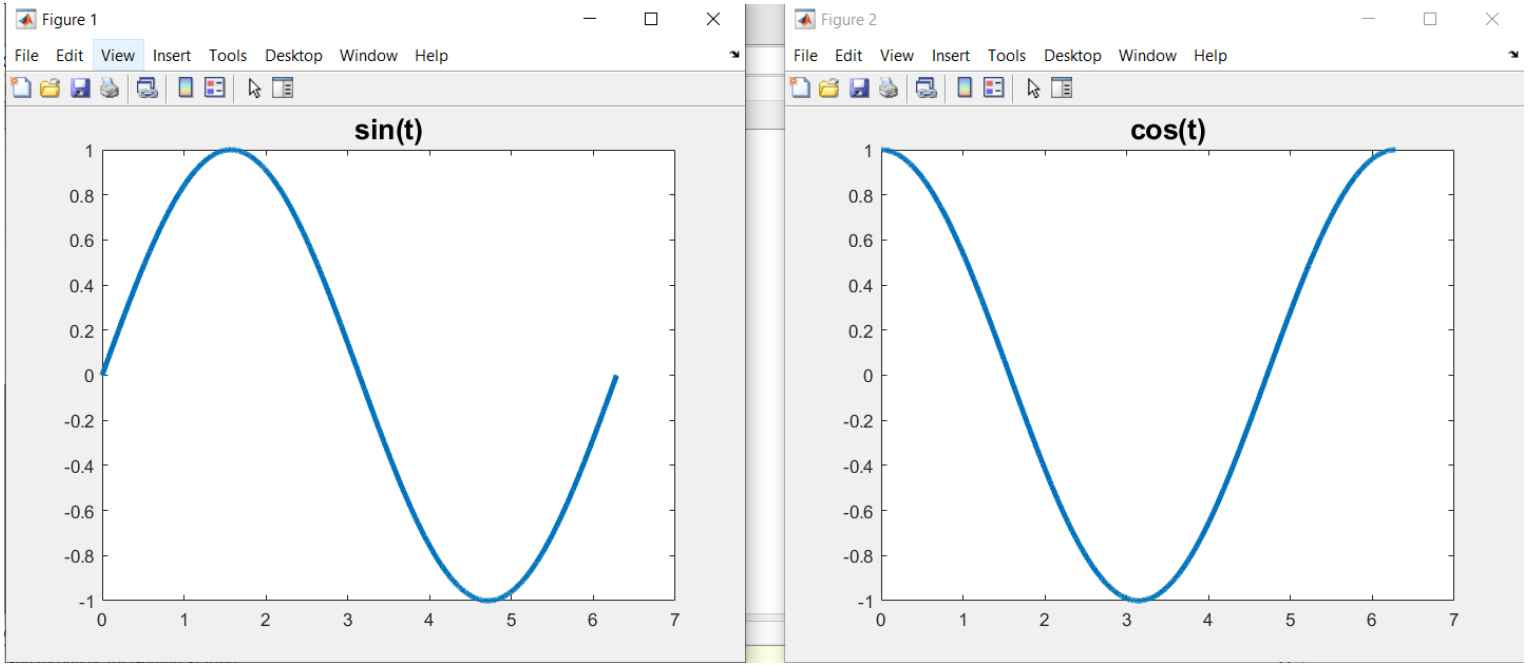



```
t=0:0.001:2*pi;
subplot(2,1,1)
plot(t,sin(t),'LineWidth',3)
title('sin(t)','FontSize',16)
subplot(2,1,2)
plot(t,cos(t),'LineWidth',3)
title('cos(t)','FontSize',16)
```

Plotting using MATLAB

figure

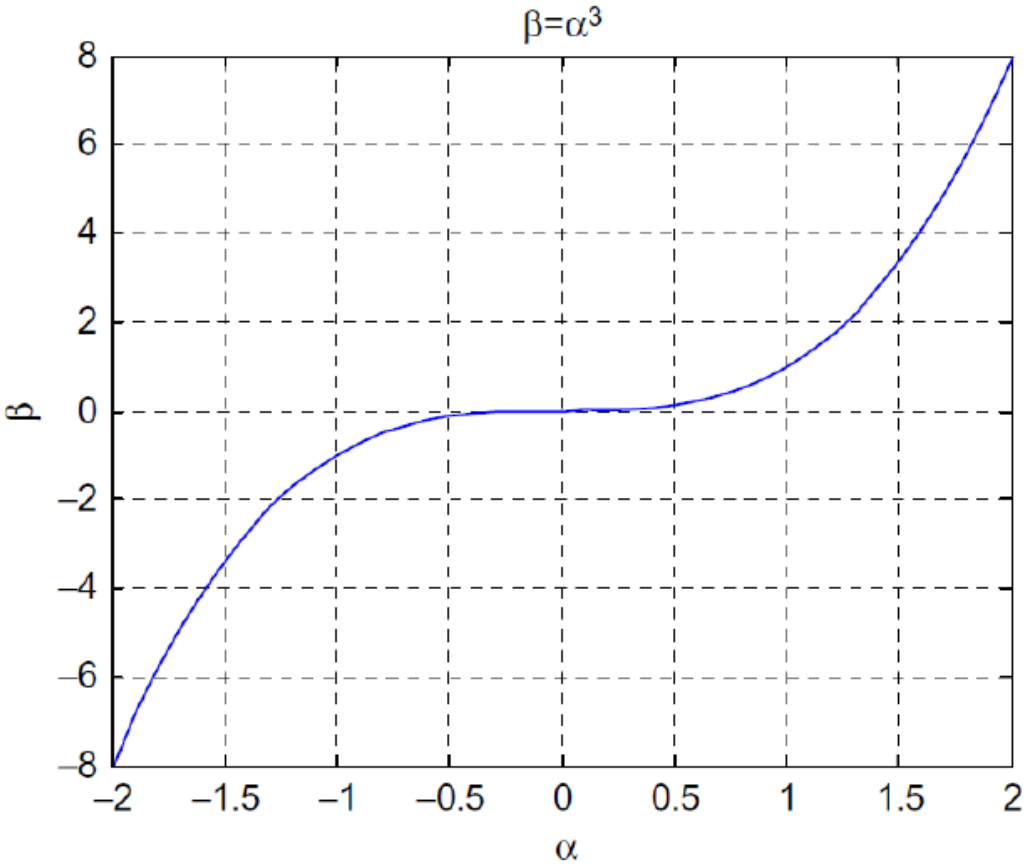
```
t=0:0.001:2*pi;
figure(1)
plot(t,sin(t),'LineWidth',3)
title('sin(t)','FontSize',16)
figure(2)
plot(t,cos(t),'LineWidth',3)
title('cos(t)','FontSize',16)
```



Plotting using MATLAB

Example:

```
alpha = -2:0.1:2;
beta = alpha.^3;
plot(alpha, beta)
xlabel('\alpha')
ylabel('\beta')
title('\beta = \alpha^3')

grid on
```

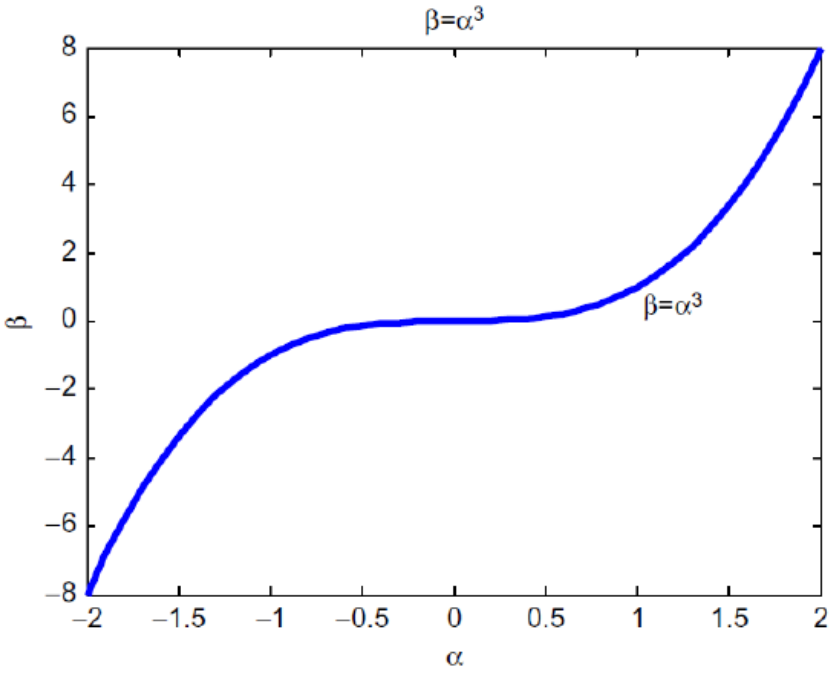



```
xlabel('\alpha','FontSize',24)
ylabel('\beta','FontSize',24)
title('\beta = \alpha^3','FontSize',17)
```

Plotting using MATLAB

Example:

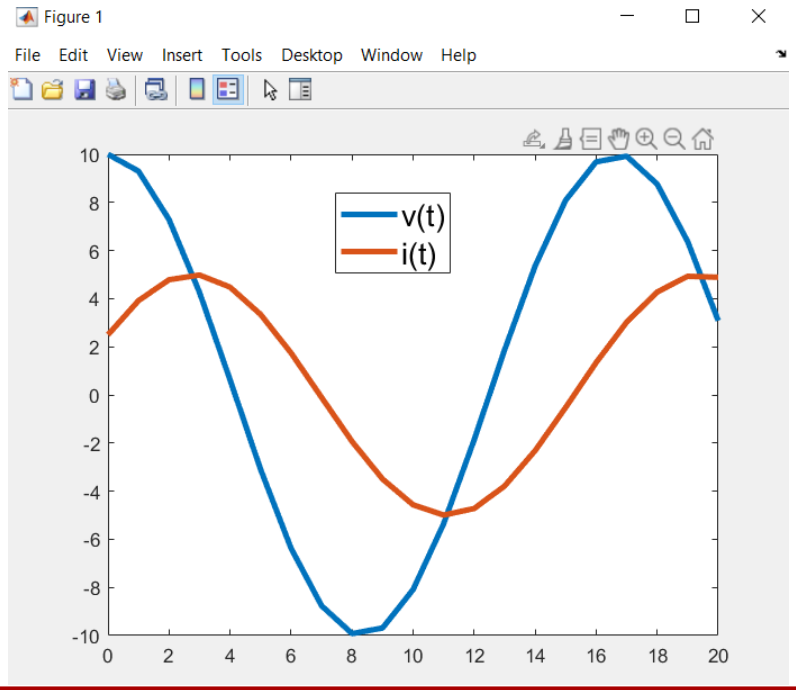
```
grid off

plot(alpha, beta ,'LineWidth',3)
xlabel('\alpha','FontSize',24)
ylabel('\beta','FontSize',24)
title('\beta = \alpha^3','FontSize',17)
text(1,0.75, '\beta = \alpha^3','FontSize',18)
```



Plotting using MATLAB

Activity(1):

In R-L circuit, the voltage v(t) and current i(t) are given as $v(t) = 10\cos(377t)$ and $i(t) = 5\cos(377t-60^{o})$. Write a Matlab script file to sketch v(t) and i(t) for t=0 to t=20 ms. (Use the commands title, label, and color)



Plotting using MATLAB

Activity(2):

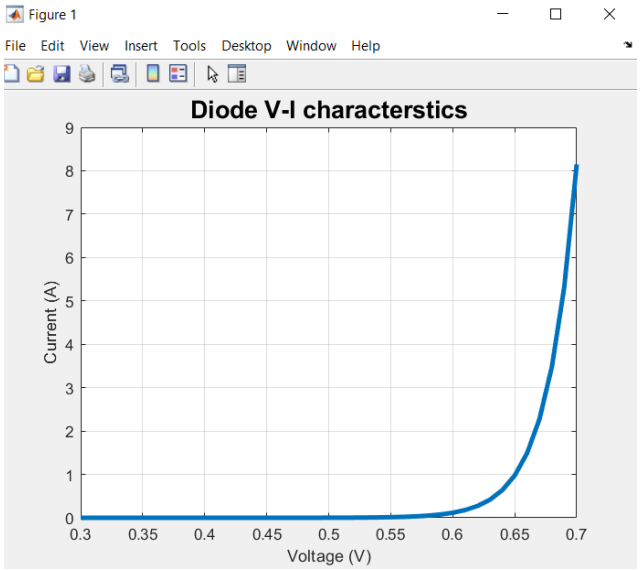
The voltage and current of a certain diode are related by the following equation:

$$I = I_s \, e^{\frac{q_e \, V_d}{k \, T}}$$

If I_S is saturation current = 10^{-12} A, k is Boltzmann's constant = 1.38×10^{-23} J / K°,

q_e is the electronic charge = 1.6×10^{-19} Coulombs, T is the temperature = 273 K°

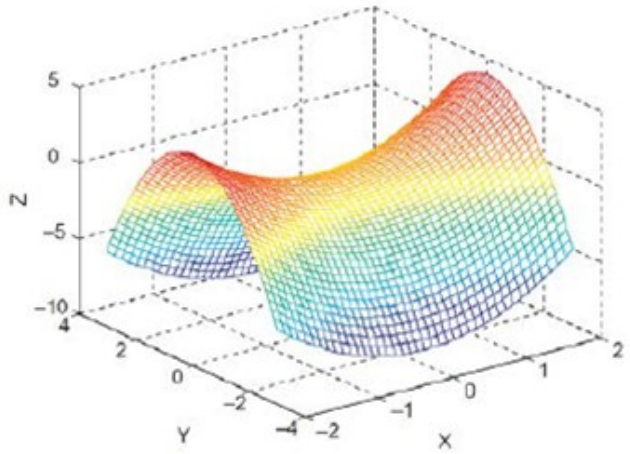
Write a MATLAB program to plot diode V-I characteristics for diode voltage changes between 0.3 V to 0.7 V



Plotting using MATLAB

3D-Plotting

```
x = -2:1:2;
y = -3:1:3;
[X,Y] = meshgrid(x,y);
Z = X.^2-Y.^2;
mesh(X,Y,Z)
xlabel('X')
ylabel('Y')
zlabel('Z')
```



>> help surf

End of Lecture

Thank you for attention!
Any questions?

Dr. Mohamed Selmy
Dr. Islam Mohamed

Quiz#1

5 Marks