CHE/CEN138

COMPUTER PROGRAMMING

OBJECTS, STRİNGS, PLOTTING

References

1.Pratap, R. “Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers”Oxford University Press, 2010.
2.Hunt, B.R., Lipsman, L.R. and Rosemberg J. M. “A guide to MATLAB for Beginners and ExperiencedUsers"Cambridge University Press, 2001.
3.Kubat, C. “MATLAB Yapay Zeka ve Mühendislik Uygulamaları” İkinci Baskı, Pusula Yayıncılık, 2014McGraw Hill, International Edition 2012.

POLYNOMIALS&CURVE FITTING

Following script fits a straight line (first order polynomial y = mx+n) to the x-y data given below and plots the given data as points(o) and fitted data as a line.

```
x=[1 2 3 4 5]          %Xdata
y=[3 5 7 9 11]         %Ydata
a=polyfit(x,y,1)       % fits a line and gives the values of m and n
yfit=polyval(a,x)      % evaluates the polynomial at Xdata
plot(x,y,'o', x,yfit)  %plot exact data and fitted line
```

It is obvious from the data that y=2x+1 and there was a perfect fit to the data.
Run the script given above and reproduce the results.

EXERCISES

- Fit a straight line to the data set given below and plot exact data and fitted line by MATLAB. For F=md+n, find the values of m and d.

d	15.5	33.07	53.39	140.24	301.03
F	0.0491	0.0981	0.1962	0.4905	0.9810

- Fit a second order polynomial to the data set given below. For y=ax2+bx+c, find the values of a, b and c by MATLAB.

x	1	2	3	4	5
y	1	4	9	16	25

STRINGS

- message='I am learning how to use strings in MATLAB'

- names=['John';'Ravi';'Mary';'Xiao']

- greet=['Hi' ;'Hello';'Namaste'] %Yes it will give error.

- greet=['Hi ';'Hello ';'Namaste']

- greet=char('Hi','Hello','Namaste')

STRINGS

```
>> a = 5;
>> b = 3;
>> str = sprintf('Hello %d + %d = %d. Good!', ...
                 a, b, a+b)
str =
Hello 5 + 3 = 8. Good!
```

STRINGS

```
>> S = '2.7183  3.1416';
>> A = sscanf(S,'%f')

A =
    2.7183
    3.1416
```

STRINGS(FPRINTF)

Code	Result
• fprintf('%e\n', 1223.56);	1.223560e+003
• fprintf('%E\n', 1223.56);	1.223560E+003
• fprintf('%e\n', 0.005);	5.000000e-003
• fprintf('%.3f', 68667.6789);	68667.679
• fprintf('%4d%4d\n', 56, 87);	56 87
• fprintf('%-4d%-4d\n', 56, 87);	+56 87
• fprintf('%+4d%4d\n', 56, 87);	547
• fprintf('% d\n% d\n', 547, -547);	-547

PLOTTING

Step	Code
Prepare your data	`x = 0:0.2:12;`

Select a window and position a plot region within the window	`figure(1)`
	`subplot(2,`
	`2,1)`

Call elementary plotting function	`h = plot(x,y1,x,y2,x,y3);`

Select line and marker characteristics	`set(h,'LineWidth',2,`
	`{'LineStyle'},{'--';':';'-.'})`
	`set(h,{'Color'},{'r';'g';'b'})`

PLOTTING

Step	Code
Set axis limits, tick marks, and grid lines	`axis([0 12 -0.5 1])` `grid on`

Annotate the graph with axis labels, legend, and text	`xlabel('Time')`
	`ylabel('Amplitude')`
	`legend(h,'First','Second','Third')`
	`title('Bessel Functions')`
	`[y,ix] = min(y1);`
	`text(x(ix),y,`
	`'First Min \rightarrow',...`
	`'HorizontalAlignment','right'`

Export graph	`print -depsc -tiff -r200 myplot`

PLOTTING

Step	Code
Set axis limits, tick marks, and grid lines	`axis([0 12 -0.5 1])` `grid on`

Annotate the graph with axis labels, legend, and text	`xlabel('Time')`
	`ylabel('Amplitude')`
	`legend(h,'First','Second','Third')`
	`title('Bessel Functions')`
	`[y,ix] = min(y1);`
	`text(x(ix),y,`
	`'First Min \rightarrow',...`
	`'HorizontalAlignment','right'`

Export graph	`print -depsc -tiff -r200 myplot`

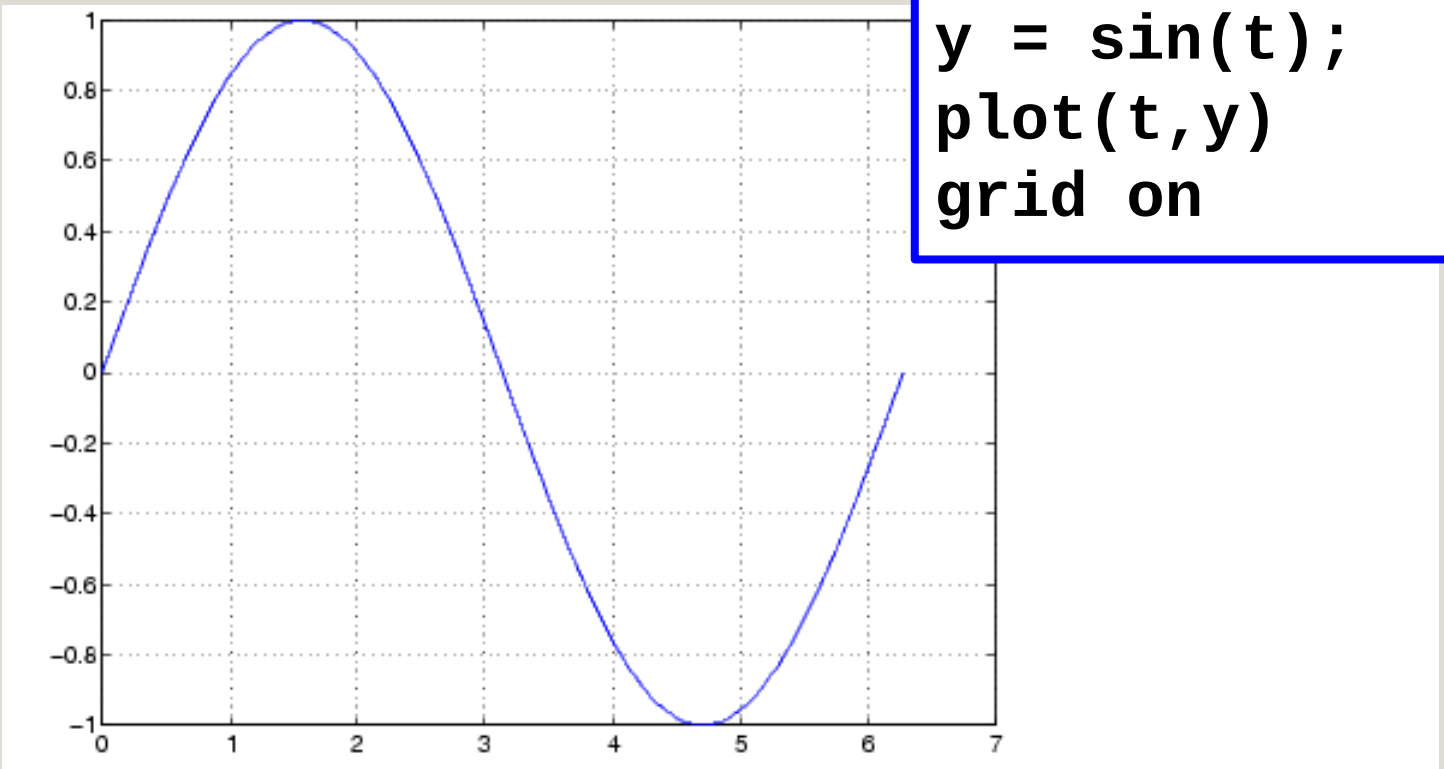
PLOTTING

Function	Description
`plot`	Graph 2-D data with linear scales for both axes
`plot3`	Graph 3-D data with linear scales for both axes
`loglog`	Graph with logarithmic scales for both axes
`semilogx`	Graph with a logarithmic scale for the *y*-axis and a linear scale for the *x*-axis
`semilogy`	Graph with a logarithmic scale for the *y*-axis and a linear scale for the *x*-axis
`plotyy`	Graph with *y*-tick labels on the left and right side

PLOTTING

Function	Description
`plot`	Graph 2-D data with linear scales for both axes
`plot3`	Graph 3-D data with linear scales for both axes
`loglog`	Graph with logarithmic scales for both axes
`semilogx`	Graph with a logarithmic scale for the *y*-axis and a linear scale for the *x*-axis
`semilogy`	Graph with a logarithmic scale for the *y*-axis and a linear scale for the *x*-axis
`plotyy`	Graph with *y*-tick labels on the left and right side

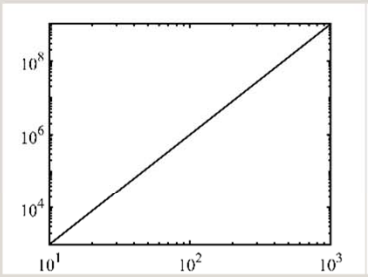
PLOTTING



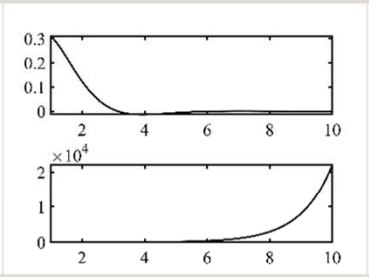

```
t = 0:pi/100:2*pi;
y = sin(t);
plot(t,y)
grid on
```

PLOTTING

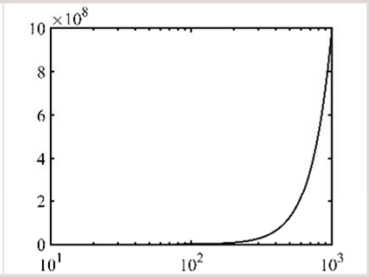
1. Match the following plots with the related scripts given below.



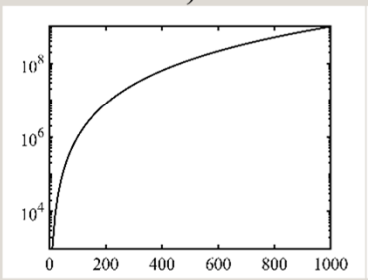
…)



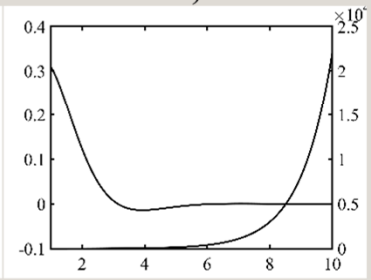
…)



…)



…)



…)

a) x=0:10:1000;
y=x.^3;
semilogx(x,y)

b) x=1:0.1:10;
y1=exp(-x).*sin(x);
y2=exp(x);
plotyy(x,y1,x,y2)

c) x=0:10:1000;
y=x.^3;
semilogy(x,y)

d) x=1:0.1:10;
y1=exp(-x).*sin(x);
y2=exp(x);
subplot 211
plot(x,y1)
subplot 212
plot(x,y2)

e) x=0:10:1000;
y=x.^3;
loglog(x,y)