

MATLAB Tutorial 02

ENME 303 Computational Methods for Engineers

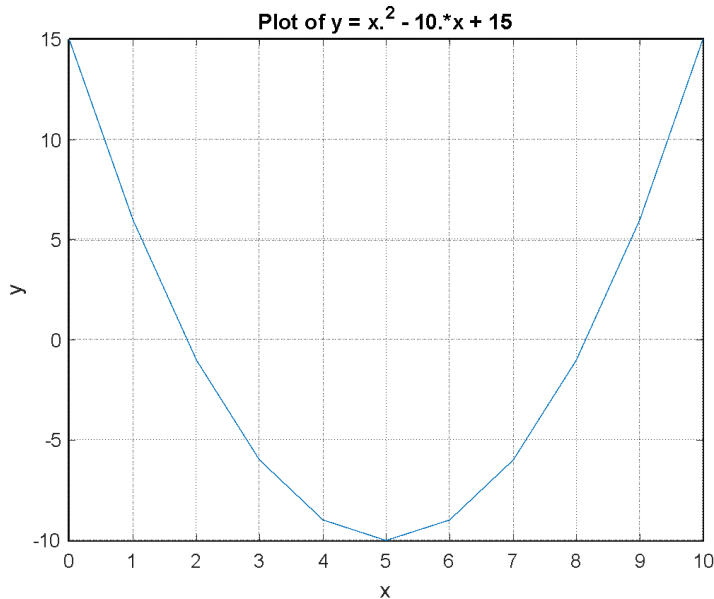
Parham Oveissi

Plot

- `plot (x, y, 'Color Linestyle Marker', 'linewidth', 3)`
 - plots the vector `y` with respect to `x`.

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

title, xlabel, ylabel, grid



```
x = 0:1:10;  
y = x.^2 - 10.*x + 15;  
plot(x,y);  
title('Plot of y = x.^2 - 10.*x + 15');  
xlabel('x');  
ylabel('y');  
grid on;
```

Multiple Plots

- Making a new figure:

```
>> figure;
```

```
>> plot(x1,y1)
```

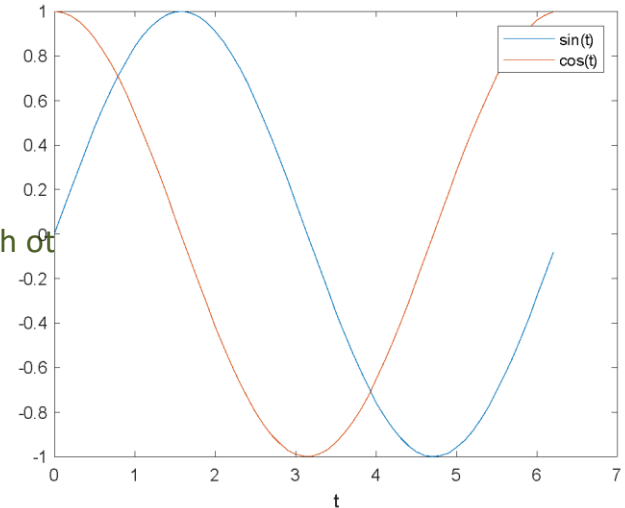
```
>> hold on %Allows plotting multiple traces on top of each other
```

```
>> plot(x2,y2)
```

```
>> legend ('sin(t)', 'cos(t)')
```

- subplot?!
- semilogx?!
- semilogy?!
- plotyy?!

Use doc <function name> for more information



Loops (for loop)

- The for loop is a loop that executes a block of statements a specified number of times.

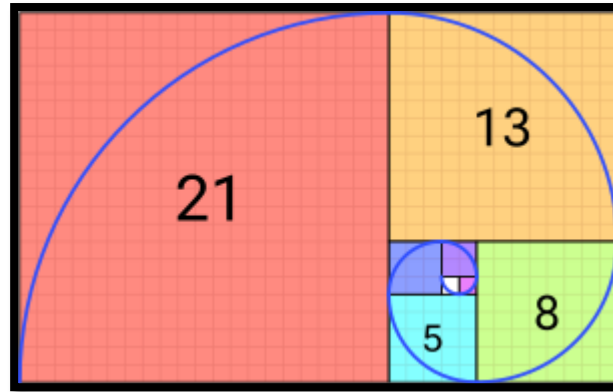
```
for k = i : T : n  
    commands f(k)  
end
```

```
for i = 0:10  
    disp(i)  
end
```

```
for  $k_1 = i_1 : T_1 : n_1$   
    for  $k_2 = i_2 : T_2 : n_2$   
        .  
        .  
        commands  $f(k_1, k_2)$   
        .  
        .  
    end  
end
```

For Loop Example

- [Fibonacci Sequence](#) :
 - 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, ...
 - $x(1) = 1$, $x(2) = 2$, $x(n) = x(n-1) + x(n-2)$ for $n \geq 3$
- [Golden Ratio](#):
 - $\frac{x(n)}{x(n-1)}$



Loops (while loop)


- A while loop is a block of statements that are repeated indefinitely as long as some condition is satisfied.

```
while dynamic logical expression  
    commands  
    updating dynamic logical expression  
end
```

```
i = 1;  
while i<=5  
    fprintf('i = %0.0f\n', i)  
    i = i + 1;  
end
```


if, else, elseif

```
if logical expression  
    commands  
end
```



```
N = input('Enter a Number: ');  
flag = 0;  
if N > 70  
    flag = 1;  
end  
fprintf('flag is: %0.0f\n', flag);
```

```
if logical expression  
    commands 1  
else  
    commands 2  
end
```



```
N = 10;  
if rem(N,2) == 0  
    fprintf('Number is even \n');  
else  
    fprintf('Number is odd \n');  
end
```

```
if logical expression 1  
    commands 1  
elseif logical expression 2  
    commands 2  
.  
.  
elseif logical expression n-1  
    commands n-1  
else  
    commands n  
end
```


break and continue

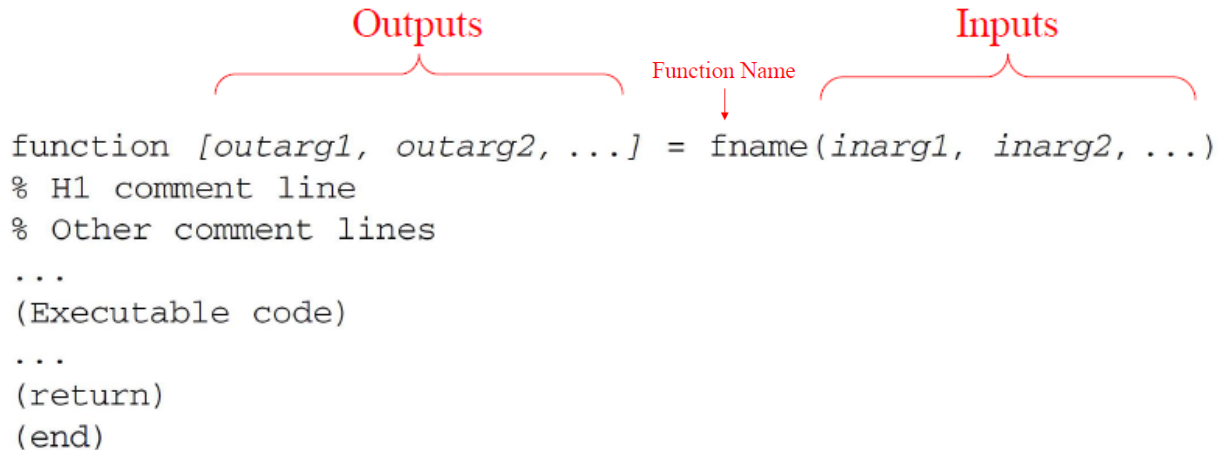
```
for k = i : T : n
    if logical expression
        break or continue
    end
    commands f(k)
end
```



```
for i = 1:1:5
    if i == 3
        break or continue
    end
    fprintf('i = %0.0f\n', i)
end
```

Functions

- Each ordinary MATLAB function should be placed in a file with the same name (including capitalization) as the function along with the file extension “.m”. For example, if a function is named `My_fun`, that function should be placed in a file named `My_fun.m`.



The diagram illustrates the syntax of a MATLAB function. Red curly braces group the output arguments (`outarg1, outarg2, ...`) under the label "Outputs" and the input arguments (`inarg1, inarg2, ...`) under the label "Inputs". A red arrow points from the label "Function Name" to the function name (`fname`) in the function signature.

```
function [outarg1, outarg2, ...] = fname(inarg1, inarg2, ...)
% H1 comment line
% Other comment lines
...
(Executable code)
...
(return)
(end)
```

Functions

- A function is invoked by naming it in an expression together with a list of actual arguments. A function can be invoked by typing its name directly in the Command Window or by including it in a script file or another function.



```
function [outarg1, outarg2, ...] = fname(inarg1, inarg2, ...)  
% H1 comment line  
% Other comment lines  
...  
(Executable code)  
...  
(return)  
(end)
```

```
>> fname (x , y, ...)
```

Thanks!