

# MCVNCD Tutorial 1

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## MCVNCD Desktop

The Command Window is where you type the commands or instructions into MCVNCD.  
The Command History contains a record of all the commands entered in the Command Window.  
The Workspace is where your data is stored in MCVNCD during the current session.

## MCVNCB Fundamentals

MATLAB can be used as a calculator performing simple and complex calculations.

```
>> t = 2;  
>> x = sin(3*t+pi/2)^2
```

x =

0.9219

MATLAB saves data in variables. You can think of MATLAB variables as data containers.

All variables are arrays. Even scalar variables are treated as 1x1 arrays.

There are two ways to create a sequence of equally spaced values

```
>> x = 1:2:11
```

x =

1 3 5 7 9 11

```
>> x = linspace(1,11,6)
```

x =

1 3 5 7 9 11

To transpose it

```
>> x = x'
```

x =

1  
3  
5  
7  
9  
11

To check the size of an array:

```
>> size(x)
```

*ans* =

6 1

The semicolon can be used to suppress output in the command window

```
>> t = 0:0.01:100;
```

To create matrices

```
>> A = [1 2 3;4 5 6;7 8 9]
```

*A* =

1 2 3  
4 5 6  
7 8 9

Row separator: ; or enter

```
>> ones(2)
```

*ans* =

1 1  
1 1

```
>> zeros(3,2)
```

*ans* =

0 0  
0 0

0 0

>> eye(3)

ans =

1 0 0  
0 1 0  
0 0 1

To access the (2,3) element of an array use A(2,3)

To access the second row, use A(2,:)

What do we access by A(2,[1 2]) ?

To concatenate matrices

>> A =

1 2 3  
4 5 6  
7 8 9

>> B = [A A]

B =

1 2 3 1 2 3  
4 5 6 4 5 6  
7 8 9 7 8 9

>> B = A + 2

B =

3 4 5  
6 7 8  
9 10 11

>> B = 3\*A

B =

3 6 9  
12 15 18  
21 24 27

What's the difference between A\*C and A.\*C?

## Script Files

A collection of commands that you would execute in the Command Window.  
Automate repetitive tasks instead of typing the same commands over and over again.

## Writing Functions

```
function output = function_name(input)
```

The name of the file has to be the same as the name of the function.

Make repetitive tasks more modular and the code more reusable.

They have a separate workspace which is automatically cleared on exit of the function.

## Flow and Loop Control

If-Elseif-Else

While. Run multiple iterations of an operation until a condition is no valid

For. Repeat an operation for a known number of iterations.

```
x = 0;  
for i=1:10  
    x = x+i;  
end
```

*x*

```
z = 1:10;  
x = sum(z)
```

## Probability/Statistics Built-in functions

rand

randn

mean

median

std

var

quantile

prctile

normpdf

normcdf

norminv

```
v= 1:20;
```

Suppose we wanted to randomly choose ten elements of v.

```
>> v = 1:20;  
>> vsample10 = randsample(v,10)
```

```
vsample10 =
```

```
14  4 16 17 12 15 20 10 11  3
```

Compute the mean and standard deviation of this sample.

```
>> mean(vsample10)
```

```
ans =
```

```
12.2000
```

```
>> std(vsample10)
```

```
ans =
```

```
5.4528
```

We can also compute quantiles

```
>> quantile(vsample10,0.5)
```

```
ans =
```

```
13
```

```
>> median(vsample10)
```

```
ans =
```

```
13
```

Let's generate ten random numbers from the normal distribution, say with mean 5 and variance 4.

```
>> r = 5 + 2.*randn(10,1)
```

We can compute the cdf with normcdf

```
>> normcdf(5,5,2)
```

*ans =*

*0.5000*

There are several related functions for other probability distributions, for example:

Binomial – binornd, binopdf

Poisson – poissrnd, poisspdf

Uniform – unifrnd, unifpdf

Gamma – exprnd, exppdf

## **Help**

There may be times when you forget how to use a certain function, even though you remember the function's name. In this case, simply type `help function_name`

*>> help norminv*

For documentation you can type `doc`

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