

Matlab Tutorial

- Read Tutorial.
- Run "demo"
- Running Matlab
 - setting the path
 - by `cd`
 - by `path(path,'dir_path');`
 - by `startup.m`
- Assistance
 - `help <instruction>`
 - `lookfor <word>`
- Matrix/vector definitions
 - `a=2;` or `a=2`
 - `b=[1 2 ; 3 4];`
 - `c=[b b];` or `c=[b ; b ; a a];`
 - `v=1:5;`
 - `v=1:2:10;`
 - `v=10:-2:1;`

- Matrix Operations
 - `c=b+b;` `c=b-b;`
 - `c=b*b;` `c=b.*b;`
 - `c=b*2;` `c=b.*2;`
 - `c=b./2;`
 - `c=b.^2;` `b^2;`
 - `c=b.^-1;` `c=b^-1;`
 - `c=b'` ;
- Assignments using functions
 - `a=zeros(2,2);` `a=ones(2,3);`
 - `a=ones(3,3);`
- Scalar functions (element by element)
 - `abs(b);`
 - `round(b);`
 - `sin(b);` `cos(b);`
 - `floor(b);` `ceil(b);`
- Vector functions (column by column)
 - `max(b);` `min(b);`
 - `sum(b);` `mean(b);`
- Matrix functions
 - `size(b);`

- Relations

```
c=(b==2) ;  
c=(b>2 & b<=4) ;  
c=(b~=a);
```

- Sub-Matrices

```
a=[1:12];  
b=reshape(a,3,4);  
c=b(:); max(b(:));  
b(2,1);  
b(:,2);  
b(2,:);  
b(2:3,1:2:4); b([2 3],[1 3]);  
c=(b>2 & b<4); sum(c(:))
```

- Control Flow: I f

```
if expression  
    statements  
elseif expression  
    statements  
else statements  
end
```

- Control Flow: for/while

```
for var=expression,  
    statements  
end;
```

- I/O:

```
fprintf  
disp  
input
```

- Graphics

```
plot  
bar  
mesh
```

- m-files: scripts and functions

- Running script
- Functions

•Functions

```
function num=ent_num(mat,lb,up)
% num=ent_num(mat,lb,up)
%
% Input: mat - a matrix
%       lb - lower bound
%       up - upper bound
% Output: returns the number of entries in mat that
%         are >= lb and <= up.
%

a=mat>=lb & mat<=up;
num=sum(a(:));
fprintf('Num of entries greater than %d and less than %d is %d \n',...
        lb,up,num);
```

```
function [minVal,maxVal]=max_min(mat)
% [minVal,maxVal]=max_min(mat)
%
% Input: mat - a matrix
% Output: returns the minimum and maximum entry
%         in matrix mat.
%
minVal = min(mat(:));
maxVal = max(mat(:));
```

Supplied functions:

readImage.m - reads a grayscale image from a file.

writeImage.m - writes a grayscale image into a file.

showImage.m - opens a window and displays a grayscale image in its true size.

putImage.m - opens a window and displays a grayscale image in a resizable mode.