

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  $\geq$  lb and  $\leq$  up.
```

```
%
```

```
a=mat $\geq$ lb & mat $\leq$ 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.