

Matlab Tutorial

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GETTING STARTED

1. Matlab executes a file called `startup.m` when it starts. If you do not have such a file, then it uses its defaults for your MATLAB environment.
2. Getting Help:
 - (a) typing `help` will show you all matlab commands
 - (b) typing `help command` will give you help with a particular command.
3. If you enter a command then press the RETURN key, Matlab will print the answer on your screen. If you want to suppress this output, put a semicolon (;) after your command.
4. To save your session and reload it later, type

```
save <filename>
load <filename>
```

The `<filename>` indicates an optional filename. If I omit it, my work will be saved as `matlab.mat`. If I call it, say **fred**, it will be saved as `fred.mat`.

5. To make a transcript of all your commands, then turn it off later, type

```
diary <filename>
diary off
```

6. All commands entered at the same session are saved in your Matlab *workspace*. To list the current variables in your workspace, type `who`
7. To temporarily escape from Matlab and execute a DOS (unix) command, type an exclamation followed by the command. For example:

```
! DIR    - will list files in your current directory - Windows
! ls     - will list files in your current directory - unix
! edit <filename> - will edit filename assuming you have an
                  external program edit
```

SIMPLE MATRIX CALCULUS

1. Entering Matrices: matlab recognizes several formats for matrices:

```
A=[1 2; 3 4]
A=[1 2
   3 4]
```

Yields the same two by two matrix.

2. Some Standard Matrices

<code>eye(n)</code>	- the nxn Identity Matrix	Minimat same
<code>zeros(n)</code>	- the nxn zero matrix	<code>zeros(n,m)</code>
<code>ones(n)</code>	- the nxn matrix with all ones	<code>ones(n,m)</code>
<code>rand(m,n)</code>	- a randomly generated mxn matrix	same

3. Built in Functions

```
A'      the conjugate transpose of matrix A
A*B     product of matrices A and B (provided dimensions match)
inv(A)  inverse of matrix A
A^n     is the n th power of matrix A
poly(A) is the characteristic polynomial of A
eig(A)  eigen values of A
det(A)  is the determinant of A
trace(A) is the trace of A
```

4. Scripts and Functions: You can write matlab commands into an **M-file** called `something.m` which you can read into your matlab session by just typing `something`. Here is an example of a function called `invx.m`:

```
function B = invx(A) % find the inverse of A
[n n] = size(A); Save=A; B=eye(n);
for k=1:n
    [y,h] = max(abs(A(k:n,k))); h=k+h-1; % h is row of next pivot
    A([k h],:) = A([h k],:); % swap row h and k
    B([k h],:) = B([h k],:); % do the same row op to B
    c=A(k,k);
    A(k,:) = A(k,+)/c; % want A(k,k)=1
    B(k,:) = B(k,+)/c; % do same row op to B
    for i = [1:k-1,k+1:n] % for each i different from k
        c=-A(i,k);
        A(i,:) = A(i,:) + c*A(k,:); % want A(i,k)=0
        B(i,:) = B(i,:) + c*B(k,:); % do same row op to B
    end
end
end
A=Save;
```