

# MATLAB CHEAT SHEET

Throughout this document  $x$  and  $y$  will be either row or column vectors and  $A$  will always be a matrix.

## Basics

<code>clc</code>	Clear command window
<code>clear</code>	Clear all variables
<code>clf</code>	Clear all plots
<code>close all</code>	Close all plots
<code>doc function</code>	Open help page for function
<code>% This is a comment</code>	Comments
<code>ctrl-c</code>	Abort the current operation
<code>format short</code>	Display 4 decimal places
<code>format long</code>	Display 15 decimal places
<code>disp('text')</code>	Print text

## Defining and Changing Variables

<code>a = 3</code>	Define variable $a$ to be 3
<code>x = [1, 2, 3]</code>	Set $x$ to be the row vector $[1, 2, 3]$
<code>x = [1; 2; 3]</code>	Set $x$ to be the column vector $[1, 2, 3]^T$
<code>A = [1, 2, 3, 4; 5, 6, 7, 8; 9, 10, 11, 12]</code>	Set $A$ to be a $3 \times 4$ matrix
<code>x(2) = 7</code>	Change $x$ from $[1, 2, 3]$ to $[1, 7, 3]$
<code>A(2,1) = 0</code>	Change $A_{2,1}$ from 5 to 0

## Basic Arithmetic and Functions

<code>3*4, 7+4, 2-6, 8/3</code>	multiply, add, subtract and divide
<code>3^7</code>	Compute $3^7$
<code>sqrt(5)</code>	Compute $\sqrt{5}$
<code>log(3)</code>	Compute $\ln(3)$
<code>log10(100)</code>	Compute $\log_{10}(100)$
<code>abs(-5)</code>	Compute $ -5 $
<code>sin(5*pi/3)</code>	Compute $\sin(5\pi/3)$
<code>floor(3.8)</code>	Compute $\lfloor 3.8 \rfloor$

## Constructing Matrices and Vectors

<code>zeros(12, 5)</code>	Make a $12 \times 5$ matrix of zeros
<code>ones(12, 5)</code>	Make a $12 \times 5$ matrix of ones
<code>eye(5)</code>	Make a $5 \times 5$ identity matrix
<code>eye(12, 5)</code>	Make a $12 \times 5$ identity matrix
<code>linspace(1.4, 6.3, 1004)</code>	Make a vector with 1004 elements evenly spaced between 1.4 and 6.3
<code>logspace(1.4, 6.3, 1004)</code>	Make a vector with 1004 elements where the log of the spacing is evenly increasing between 1.4 and 6.3
<code>7:15</code>	Row vector of 7, 8, ..., 14, 15

## Operations on Matrices and Vectors

<code>3 * x</code>	Multiply every element of $x$ by 3
<code>x + 2</code>	Add 2 to every element of $x$
<code>x + y</code>	Element-wise addition of two vectors $x$ and $y$
<code>A * y</code>	Product of a matrix and vector
<code>A * B</code>	Product of two matrices
<code>A .* B</code>	Element-wise product of two matrices
<code>A ^ 3</code>	Square matrix $A$ to the third power
<code>A .^ 3</code>	Every element of $A$ to the third power
<code>cos(A)</code>	Compute the cosine of every element of $A$
<code>abs(A)</code>	Compute the absolute values of every element of $A$
<code>A'</code>	Transpose of $A$
<code>inv(A)</code>	Compute the inverse of $A$
<code>det(A)</code>	Compute the determinant of $A$
<code>eig(A)</code>	Compute the eigenvalues of $A$
<code>size(A)</code>	Get the size of $A$

## Entries of Matrices and Vectors

<code>x(2:12)</code>	The 2 <sup>nd</sup> to the 12 <sup>th</sup> elements of $x$
<code>x(2:end)</code>	The 2 <sup>nd</sup> to the last elements of $x$
<code>x(1:3:end)</code>	Every third element of $x$ from the first to last
<code>A(5,:)</code>	Get the 5 <sup>th</sup> row of $A$
<code>A(:,5)</code>	Get the 5 <sup>th</sup> column of $A$
<code>A(5, 1:3)</code>	Get the first to third elements in the 5 <sup>th</sup> row

## Plotting

<code>plot(x,y)</code>	Plot $y$ versus $x$ (must be the same length)
<code>loglog(x,y)</code>	Plot $y$ versus $x$ on a log-log scale (both axes have a logarithmic scale)
<code>semilogx(x, y)</code>	Plot $y$ versus $x$ with $x$ on a log scale
<code>semilogy(x, y)</code>	Plot $y$ versus $x$ with $y$ on a log scale
<code>axis equal</code>	Force the $x$ and $y$ axes to be scaled equally
<code>title('A Title')</code>	Add a title to the plot
<code>xlabel('x label')</code>	Add a label to the $x$ axis
<code>ylabel('y label')</code>	Add a label to the $y$ axis
<code>legend('foo', 'bar')</code>	Label 2 curves for the plot
<code>grid</code>	Add a grid to the plot
<code>hold on</code>	Multiple plots on single figure
<code>figure</code>	Start a new plot

## Constants

<code>pi</code>	$\pi = 3.141592653589793$
<code>NaN</code>	Not a number (i.e. 0/0)
<code>Inf</code>	Infinity
<code>realmax</code>	Largest positive floating-point number $1.7977 \cdot 10^{308}$
<code>realmin</code>	Smallest positive floating-point number $2.2251 \cdot 10^{-308}$

# MATLAB CHEAT SHEET

## For loops

```
for k = 1:5
    disp(k);
end
```

## While loops

```
k = 0;
while k < 7
    k = k + 1;
end
```

## Logicals

```
a = 10; % Assign a the value of 10
a == 5 % Test if a is equal to 5
false
a == 10 % Test if a is equal to 10
true
a >= 5 % Test if a is greater than or equal to 5
true
a < 11 % Test if a is less than 11
true
a ~= 4 % Test if a is not equal to 4
true
a > 1 && a ~= 10 % Test if a is greater than 1 AND
false % not equal to 10
a > 1 || a ~= 10 % Test if a is greater than 1 OR
true % not equal to 10
```

## Conditional Statements

```
if a > 10
    disp('Greater than 10');
elseif a == 5
    disp('a is 5');
else
    disp('Neither condition met');
end
```

## Functions

```
function output = addNumbers(x, y)
    output = x + y;
end

addNumbers(10, -5)
5
```

## Function Handles

```
f = @(x) sin(x.^2)./(5*x);

f(pi/2)
0.0795
f([-pi/2, 0, pi/2])
-0.0795 NaN 0.0795
```

## Plotting

```
x = linspace(-3*pi, 3*pi, 1000);
y1 = sin(x);
y2 = cos(x);

plot(x, y1, 'k-'); % Plot sin(x) as a black line
hold on % Now we can add another curve
plot(x, y2, 'r-'); % Plot cos(x) as a red line

% Set the axis limits
axis([-3*pi, 3*pi, -1.5, 1.5])

% Add axis labels
xlabel('x');
ylabel('y');

% Add a title
title('A plot of cos(x) and sin(x)');

% Add a legend
legend('sin(x)', 'cos(x)');
```

