MATLAB Cheat Sheet

A concise reference for MATLAB syntax, commands, and functionalities, ideal for students, engineers, and researchers.

Basics & Syntax

Basic Commands

`clc`	Clears the command window.
`clear`	Removes all variables from the workspace.
`clear x y`	Removes variables `x` and `y` from the workspace.
`who`	Lists current variables in the workspace.
`whos`	Lists variables and their sizes, bytes, and class.
`help command`	Displays help for the specified `command`.
`doc command`	Opens the documentation page for the specified `command`.
`exit` or `quit`	Closes MATLAB.

Data Types

`double`	Default numeric type (double-precision floating point).
`single`	Single-precision floating point.
`int8`, `int16`, `int32`, `int64`	Signed integer types.
`uint8`, `uint16`, `uint32`, `uint64`	Unsigned integer types.
`char`	Character array (string).
`logical`	Boolean type (true or false).
`cell`	Cell array (can hold different data types).
`struct`	Structure array (fields with different data types).

Operators

`=`	Assignment operator.
`+`, `-`, `*`, `/`, `^`	Arithmetic operators (addition, subtraction, multiplication, division, exponentiation).
`.+`, `.-`, `.*`, `./`, `.^`	Element-wise arithmetic operators.
`==`, `~=`, `>`, `<`, `>=`, `<=`	Relational operators (equal, not equal, greater than, less than, greater than or equal, less than or equal).
`&&`, `||`, `~`	Logical operators (AND, OR, NOT).
`:`	Colon operator (creates sequences).

Arrays and Matrices

Array Creation

`[1 2 3]`	Creates a row vector.
`[1; 2; 3]`	Creates a column vector.
`[1 2; 3 4]`	Creates a 2x2 matrix.
`1:5`	Creates a row vector from 1 to 5 (step size 1).
`1:0.5:5`	Creates a row vector from 1 to 5 (step size 0.5).
`linspace(0, 10, 5)`	Creates a row vector with 5 equally spaced points between 0 and 10.
`zeros(2, 3)`	Creates a 2x3 matrix of zeros.
`ones(2, 3)`	Creates a 2x3 matrix of ones.
`eye(3)`	Creates a 3x3 identity matrix.

Array Indexing

`A(i, j)`	Accesses the element in the i-th row and j-th column of matrix `A`.
`A(i, :)`	Accesses the i-th row of matrix `A`.
`A(:, j)`	Accesses the j-th column of matrix `A`.
`A(1:3, 2:4)`	Accesses a submatrix of `A`.
`A(:)`	Accesses all elements of `A` as a column vector.

Matrix Operations

`A + B`	Matrix addition.
`A - B`	Matrix subtraction.
`A * B`	Matrix multiplication.
`A .* B`	Element-wise multiplication.
`A / B`	Matrix right division (A * inv(B)).
`A \ B`	Matrix left division (inv(A) * B).
`A .^ B`	Element-wise exponentiation.
`A'`	Transpose of matrix `A`.
`inv(A)`	Inverse of matrix `A`.

Control Flow & Functions

Conditional Statements

```
if condition
  % statements
elseif condition
  % statements
else
  % statements
end
```

Looping

```
for i = 1:10
  % statements
end
```

```
while condition
  % statements
end
```

Functions

```
function [output1, output2] =
my_function(input1, input2)
  % statements
  output1 = ...;
  output2 = ...;
end
```

Anonymous functions:

```
f = @(x) x.^2;
result = f(5); % result is 25
```

Switch Statement

```
switch expression
  case value1
    % statements
  case value2
    % statements
  otherwise
    % statements
end
```

Plotting

Basic Plots

`plot(x, y)`	Creates a 2D line plot of `y` versus `x`.
`scatter(x, y)`	Creates a scatter plot of `y` versus `x`.
`bar(x, y)`	Creates a bar chart.
`histogram(data)`	Creates a histogram of the data.
`pie(data)`	Creates a pie chart.

Plot Customization

`title('Plot Title')`	Sets the title of the plot.
`xlabel('X-axis Label')`	Sets the label for the x-axis.
`ylabel('Y-axis Label')`	Sets the label for the y-axis.
`legend('Data Series')`	Adds a legend to the plot.
`grid on`	Turns the grid on.
`axis([xmin xmax ymin ymax])`	Sets the axis limits.
`hold on`	Keeps the current plot and axes properties so that subsequent plotting commands add to the existing plot.
`hold off`	Releases the current plot and axes.

3D Plotting

`plot3(x, y, z)`	Creates a 3D line plot.
`surf(X, Y, Z)`	Creates a surface plot.
`mesh(X, Y, Z)`	Creates a mesh plot.
`contour(X, Y, Z)`	Creates a contour plot.