

MATLAB Guide

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CS522

Basics

MATLAB is an interpreted environment. Each statement is evaluated as it is input.

Every object is a matrix with complex floating point entries.

Storage is allocated dynamically.

Help is available via **help**, **intro**, **lookfor**, and **demo**.

Creating and manipulating matrices

Small matrices can be created by brackets, e.g. **[1 2 3 4 5 6]**.

Index matrices are created by the colon operator, in the syntax **first:step:last**, where the default step size is 1.

Use **ones**, **zeros**, **rand**, and **eye** to build common blocks.

Use **diag**, **triu**, and **tril** to work with diagonals and triangles.

To get a subblock, use the form **A(rows, cols)**.

vec=A(:) stacks the columns of A into a vector. **A(:)=vec** leaves the shape of A alone but puts in the entries of vec (assuming compatible lengths).

Simple operations

Matrix multiply is *****, conjugate transposition is **'**, and linear system solve is ****.

A dot before an operator makes it act componewise. The operands must be the same size, except sometimes one may be scalar (as in **A.^2**).

Many functions are "vectorized", meaning they act componewise (compare **exp** to **expm**). Vectorized code is often easier to read and usually much faster.

Functions and scripts

A script is a text file of commands, saved with an extension of **.m**. It executes in the base workspace.

A function is like a script, but has a header defining input and output arguments. It has its own variable scope.

A function will typically execute faster than a script, and is required for MATLAB routines such as **fmin**.

Anything on a line after a percent sign **%** is considered a comment. To see the contents of a function or script, use **type**.

Functions and scripts must be in the current directory or on the MATLAB path, which is accessed through **path**.

Functions can be debugged using **dbstop** and the other commands found through **help debug**.

Graphics

The 2D plotting commands are **plot**, **semilogx**, **semilogy**, and **loglog**. They are vectorized.

The common 3D plotting commands are **surf**, **mesh**, and **plot3**. Planar visualizations of 3D data are done with **contour** and **pcolor**.

To superimpose a new line, use **hold on**. To get a new figure window, enter **figure**.

Titles and axis labels are done with **title**, **xlabel**, etc. There is a **legend** command.

Use **print** to send the current figure to the printer. Use **print fig** to create a postscript file, **fig.ps**.

Graphics objects have "handles" which allow access to virtually all their display properties via **set** and **get**.