Useful Matlab Examples

Basic Math

Addition: 2 + 3
Division (using previous answer): ans/4
Exponentiation: 31 \(^\wedge\) 4
Trig functions: log(100); sin(90 \(\times\) pi/180)

Vectors

Assigning values: \(x = [0 : 1 : 5]; x = [7.5 : 2 : 33]\)
Taking a subset of the vector: \(x(2 : 5)\)
Assigning a single value: \(x(4) = x(3) + \pi\)
Flipping between row and column vectors: \(x'\)
Reversing a row vector: flipdim(x, 2)
Squaring individual elements: \(y = x. \wedge 2\)

Matrices

Assignment: \(x = [1 2 3 ; 3 1 2 ; 2 3 1]; x(2, 2) = 6\)
Math: \(x/4\)
Exponentiation: \(x. \wedge 2\)
Matrix multiplication: \(x \wedge 2\)
Extracting vectors: \(x(1, :); x(:, 1)\)

Plotting

2D plots: plot(x, y)
Turn on/off plot overlays: hold off; hold on
3D plots: image(x); surf(x); mesh(x)
Scripting

Create a file with the name of your script, ending in .m; e.g., meanvar.m:

```matlab
def function [meanval, varval] = meanvar(data)

meanval = mean(data);
varval = var(data);
```

Images

Reading an image: `a0 = imread('c:image.bmp', 'bmp');`
Displaying an image: `image(a0)`
Assigning a subset of one color: `b0 = a0(1:445, 240:420, 2);`

Data Fitting

Erf function: `y = (erf((x - mean)/stdev) + 1) * range/2 + offset`
Computing error of fit: `err = sum((double(b0(200,:)) - y).^2)`
Minimizing an error function with respect to one variable:
`q = fminsearch(@(x) sqerferr(x, b0(200,:)), x0)`

Loops

Looping across all rows of an array:
`for i = 1 : size(b0, 1)
q = fminsearch(@(x) sqerferr(x, b0(i,:)), x0);
stdev0(i) = q(2);
end`