

MATLAB Basics

Listing Variables

who.....Display a list of all variables in memory.

whos.....List all variables including size and type information.

Creating Matrices

var = zeros (x_1, x_2, \dots, x_n) Create a n dimensional matrix with all elements equal to 0.

var = ones (x_1, x_2, \dots, x_n) Create a n dimensional matrix with all elements equal to 1.

var = rand (x_1, x_2, \dots, x_n) Create a n dimensional matrix with random elements in [0, 1].

var = rand (x_1, x_2, \dots, x_n) Create a n dimensional matrix with 0 centered Gaussian elements.

Creating Regularly Spaced Lists

var = a : b.....Set var = the row vector of integers from a to b.

var = a : x : b.....Step from a to b with a step size of x.

Merging Matrices

A=[B , C].....Concatenates B and C, such that $A = \begin{bmatrix} B & C \end{bmatrix}$

A=[B ; C].....Concatenates B and C, such that $A = \begin{bmatrix} B \\ C \end{bmatrix}$

Matrix Operations

A'Transposition

Inv (A)Inverse of **SQUARE MATRIX A**

A * B.....Multiplication

A / B.....Faster way to calculate B*inv(A)

A \ B.....Faster way to calculate inv(A)*B

Element Operations

Must be performed on either matrices with the same dimensions, or a matrix and a scalar

A + B.....Addition

A - B.....Subtraction

A . * B.....Multiplication: $A_{ij} * B_{ij}$

A . / B.....Right Division: A_{ij} / B_{ij}

A . \ B.....Left Division: B_{ij} / A_{ij}

Matrix Subsets

A = B (xa : xb)Take the range from x_a to x_b of B and store in A

A = B (xa : xb , ya : yb) Take a two dimensional subset of B and store in A

A = B (:)Take all elements of B stored as a single column vector

$A = B(xa:xb, :)$ Take all rows in columns from x_a to x_b

Image Operations

`X = imread('fname.ext');` Read image from file into X.

`X = imwrite('fname.ext');` Write image to a file.

`image(X);`.....Display X as an image.

Figure Operations

`figure`.....Display a new figure window.

`colormap('map')`.....Set the colormap for the current figure. Default maps are:
jet, hsv, hot, cool,
spring, summer, autumn, winter,
gray, bone, copper, pink, and lines.

`colormap(M)`.....Set an m by 3 matrix of numbers in the range [0,1] as a colormap.

`colorbar`.....Display the colorbar.

`clim([cmin, cmax])`...Set the upper and lower value bounds to scale color to.

Matrix Structure

`A(columns, rows, pages...)` Choose a subset of matrix A

`size(A,m)`.....Returns the size of dimension m of matrix A

`size(A)`.....Returns a vector with the size of each dimension

`rank(A)`.....Returns the rank of A

Hiding vs. Showing Output

`A = X`.....Displays the contents of A

`X`.....Displays the contents of X

`A = X;`.....Does not display any results

Commenting

```
%{  
    comment type 1  
}%
```

```
% comment type 2
```

```
... comment type 3
```

Multiline

```
X = ...  
... this is commented out  
Y;
```