Arrays and Array Operations

SIMPLE ARRAYS

Array Construction Technique	Description
`x=[2 2*pi sqrt(2) 2-3j]`	Creates row vector x containing arbitrary elements
`x=first:last`	Creates row vector x starting with `first`, counting by 1, and ending at or before `last` (Note that `x=[first:last]` produces the same result, but takes longer, since MATLAB considers both bracket and colon array-creation forms.)
`x=first:increment:last`	Creates row vector x starting with `first`, counting by increment, and ending at or before `last`
`x=linspace(first,last,n)`	Creates linearly spaced row vector x starting with `first`, ending at `last`, having n elements
`x=logspace(first,last,n)`	Creates logarithmically spaced row vector x starting with $10^{\texttt{first}}$, ending at $10^{\texttt{last}}$, and having n elements

SCALAR–ARRAY MATHEMATICS

Element-by-Element Operation	Representative Data $A = [a_1\ a_2\ \ldots\ a_n]$, $B = [b_1\ b_2\ \ldots\ b_n]$, c = <a *scalar*>
Scalar addition	$A{+}c = [a_1{+}c\ \ a_2{+}c\ \ \ldots\ \ a_n{+}c]$
Scalar subtraction	$A{-}c = [a_1{-}c\ \ a_2{-}c\ \ \ldots\ \ a_n{-}c]$
Scalar multiplication	$A{*}c = [a_1{*}c\ \ a_2{*}c\ \ \ldots\ \ a_n{*}c]$
Scalar division	$A/c = c\backslash A = [a_1/c\ \ a_2/c\ \ \ldots\ \ a_n/c]$
Array addition	$A{+}B = [a_1{+}b_1\ \ a_2{+}b_2\ \ \ldots\ \ a_n{+}b_n]$
Array multiplication	$A.{*}B = [a_1{*}b_1\ \ a_2{*}b_2\ \ \ldots\ \ a_n{*}b_n]$
Array right division	$A./B = [a_1/b_1\ \ a_2/b_2\ \ \ldots\ \ a_n/b_n]$
Array left division	$A.\backslash B = [a_1\backslash b_1\ \ a_2\backslash b_2\ \ \ldots\ \ a_n\backslash b_n]$
Array exponentiation	$A.\hat{}c = [a_1\hat{}c\ \ a_2\hat{}c\ \ \ldots\ \ a_n\hat{}c]$
	$c.\hat{}A = [c\hat{}a_1\ \ c\hat{}a_2\ \ \ldots\ \ c\hat{}a_n]$
	$A.\hat{}B = [a_1\hat{}b_1\ \ a_2\hat{}b_2\ \ \ldots\ \ a_n\hat{}b_n]$

STANDARD ARRAYS

ones(k)	Creates square matrix of size "k.k" with all its elements equal to 1
ones(i,j)	Creates a matrix of "i" rows and "j "columns with all its elements as 1
zeros(I,j)	Creates a matrix of zeros with "I" rows and "j" columns
size(g)	Displays "i,j" size of matrix g with i rows and j columns
eye(n)	Creates an identity matrix of size n.
rand(n)	Creates a square matrix of size "nxn" with randomly generated numbers between 0 and 1.
rand(i,j)	Creates a matrix of size "ixj" with randomly generated numbers between 0 and 1.
diag(a)	Creates a diagonal matrix of size "nxn" with diagonal elements "d_{ii} equal to a_i" where n is the size of vector a

ARRAY MANIPULATION

Array Addressing	Description
A(r,c)	Addresses a subarray within A defined by the index vector of desired rows in r and an index vector of desired columns in c
A(r,:)	Addresses a subarray within A defined by the index vector of desired rows in r and all columns
A(:,c)	Addresses a subarray within A defined by all rows and the index vector of desired columns in c
A(:)	Addresses all elements of A as a column vector taken column by column. If A(:) appears on the left-hand side of the equal sign, it means to fill A with elements from the right hand-side of the equal sign without changing A's shape
A(k)	Addresses a subarray within A defined by the single-index vector k, as if A were the column vector A(:)
A(x)	Addresses a subarray within A defined by the logical array x. Note that x should be the same size as A. If x is shorter than A, the missing values in x are assumed to be False. If x is longer than A, all extra elements in x must be False.

Array Size	Description
s=size(A)	Returns a row vector s whose first element is the number of rows in A, and whose second element is the number of columns in A
[r,c]=size(A)	Returns two scalars, r and c, containing the number of rows and columns, respectively
r=size(A,1)	Returns the number of rows in A
c=size(A,2)	Returns the number of columns in A
n=length(A)	Returns max(size(A)) for nonempty A, 0 when A has either zero rows or zero columns and the length of A if A is a vector
n=max(size(A))	Returns length(A) for nonempty A, and for empty A returns the length of any nonzero dimension of A
n=numel(A)	Returns the total number of elements in A