

Vectors, Matrices, Indexing

MATLAB	R	Description
a=[1 2 3 4];	a <- c(1,2,3,4)	Row vector
a=[1;2;3;4] OR a=[1 2 3 4]';	a <- t(c(1,2,3,4))	Column vector
a=[1 2 3; 4 5 6];	matrix(c(1,2,3,4,5,6),nrow=2,byrow=TRUE)	Matrix, enter by row
a=[1 2 3; 4 5 6];	matrix(c(1,4,2,5,3,6),nrow=2)	Matrix, enter by column
a(3)	a[3]	Access element #3
a=[2:7];	a <- 2:7 OR a <- c(2:7)	Vector [2 3 4 5 6 7]
a=[7:-1:2];	a <- 7:2	Vector [7 6 5 4 3 2]
a=[2:3:14];	a <- seq(2,14,3)	Vector [2 5 8 11 14]
x=linspace(a,b,n);	x <- seq(a,b,length.out=n) OR seq(a,b,len=n)	Vector with n equally spaced values between a and b, inclusive
a=zeros(a,1) OR a=zeros(1,a)	a <- rep(0,k)	Vector of length k with all zeros
a=jones(a,1) OR a=jones(1,a)	a <- rep(j,k)	Vecot of length k with all values j
a=zeros(m,n)	matrix(0,nrow=m,ncol=n) OR matrix(0,m,n)	Matrix of all zeros, size m by n
a=j*ones(m,n)	matrix(j,m,n)	Matrix of all j, size m by n
a=[a1 a2];	a <- cbind(a1,a2)	"Glue" two matrices a1 and a2 together (same # of rows)
[X,Y]=meshgrid(x,y)	m=length(x); n=length(y); X=matrix(rep(x,each=n),nrow=n); Y=matrix(rep(y,m),nrow=n)	X rows are copies of x, Y columns are copies of y
A(:,2)	A[,2]	Column 2 of matrix A
A(7,:)	A[7,]	Row 7 of matrix A
flipr(A)	t(apply(A,1,rev))	Flip the order of elements in each row of matrix A
flipud(A)	apply(A,2,rev)	Flip the order of elements in each column of matrix A
v(a:end)	v[a:length(v)]	Extract elements of v from positon a to end
No simple way	v[c(-j,-k)]	All but the jth and kth elements of v
A = reshape(A,m,n)	dim(A) <- c(m,n)	Reshape matrix A into an m by n matrix (take elements columnwise from original matrix A)



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Cell Array/List

MATLAB	R	Description
<code>v=cell(1,n); v{1}=12; v{2}='hi there'; v{3}=rand(3);</code>	<code>v <- vector('list',n); v[[1]]=12; v[[2]]='hi there'; v[[3]] = matrix(runif(9),3)</code>	Vector of length n capable of containing different data types in different elements (aka cell or list)
<code>w=v{i}</code>	<code>w=v[[i]]</code>	Extract the ith element of cell/list vector
No names associated with elements of cell arrays	<code>names(v)[3] <- 'myrandmatrix'</code>	Set the name of the ith element in a list
No names associated with elements of cell arrays	<code>names(v)</code>	See all names of elements in list
No names associated with elements of cell arrays	<code>names(v) = NULL</code>	Clear all names

Structures/Data Frames

<code>avals=2*ones(1,6); yvals=6:-1:1; v=[1 5 3 2 3 7]; d = struct('a',avals,'y',yvals,'fac',v);</code>	<code>v <- c(1,5,3,2,3,7); d <- data.frame(cbind(a=2, y=6:1,v))</code>	Create a matrix-like object with different named columns (<i>structure</i> in MATLAB, <i>data frame</i> in R)
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Basic Computation

MATLAB	R	Description
<code>a=1; b=2;</code>	<code>a <- 1; b <- 2;</code>	Variable assignment
<code>a+b; a*b; a^b; etc</code>	<code>a+b; a*b; a^b; etc.</code>	Add, subtract, multiply, divide, power
<code>--</code>	<code>a %/% b</code>	Integer division
<code>abs(a); exp(a); log(a); log10(a);</code>	<code>abs(a); exp(a); log(a); log10(a);</code>	absolute value, e, ln, log base 10
<code>sin(a); asin(a); sinh(a); asinh(a);</code>	<code>sin(a); asin(a); sinh(a); asinh(a);</code>	sin, inverse sin, hyperbolic sin, inverse hyperbolic sin
<code>mod(n,k)</code>	<code>n %% k</code>	Remainder
<code>round(x), floor(x), ceil(x)</code>	<code>round(x), floor(x), ceil(x)</code>	Round, round down, round up
<code>sign(x)</code>	<code>sign(x)</code>	Sign of x (+1, 0, or -1)

Matrix Computations

MATLAB	R	Description
<code>dot(x,y)</code>	<code>sum(x*y)</code>	Vector dot product
<code>cross(x,y)</code>	<code>xprod</code> in RSEIS package	Vector cross product
<code>A*B</code>	<code>A %*% B</code>	Matrix multiplication AB
<code>A.*B</code>	<code>A*B</code>	Element-by-element multiplication of A and B
<code>A\b</code>	<code>solve(A,b)</code>	Solve Ax=b
<code>mean(v), mean(A(:))</code>	<code>mean(v)</code> or <code>mean(A)</code>	Mean of all elements in vector or matrix
<code>mean(A), sum(A)</code>	<code>colMeans(A), colSums(A)</code>	Means or sums of columns in a matrix
<code>mean(A,2), sum(A,2)</code>	<code>rowMeans(A), rowSums(A)</code>	Means or sums of rows in a matrix
<code>std(v), std(A(:))</code>	<code>sd(v), sd(c(A))</code>	Standard deviation of all elements in a vector of matrix, normalized by (n-1)
<code>std(A)</code>	<code>sd(A)</code>	Standard deviations of columns of a matrix



Matrix Computations (cont)

std(A,2)	apply(A,1,sd)	Standard deviations of rows of a matrix
min(v), min(A(:))	min(v), min(A)	Minimum of all elements in vector or matrix
min(A)	apply(A,2,min)	Minimum value in each column of A
min(A,[],2)	apply(A,1,min)	Minimum value in each row of matrix A
min(A,c)	pmin(A,c)	Given matrix A and scalar c, compute a matrix where each element is the minimum of c and corresponding element of A
[y,ind]=min(v)	ind = which.min(v)	Find index of the first time min(v) appears in v and store that index as ind
size(A,1)	nrow(A)	Number of rows in A
size(A,2)	ncol(A)	Number of columns in A
size(A)	dim(A)	Dimensions of A, listed as a vector
length(v)	length(v)	Number of elements in vector
numel(A)	length(A)	Number of elements in matrix
sort(v)	sort(v)	Sort values in vector v
[s,idx]=sort(v)	tmp <- sort(v,index,return=TRUE); s <- tmp\$s; idx=tmp\$ix	Sort values in v, putting sorted values in s and indices in idx, in teh sense that s[k] = x[idx[k]]
find(v>5)	which(v>5)	List of indices of each element of v which are greater than 5
[r,c] = find(A>5)	w <- which(A>5, arr.ind=TRUE); r <- w[,1]; c <- w[,2];	Generate r and c giving rows and columns of elements of A which are greater than 5

Relationals and Logicals

MATLAB	R	Description
a == b; a < b; a >= b; etc.	a == b; a < b; a >= b; etc.	eq, gt, lt, gte, lte
a ~= b	a != b	Not equal
a && b; a b;	a && b; a b;	AND, OR
~a	!a	Not

GUI Commands

MATLAB	R	Description
clear all	rm(list=ls())	Clear all variables
close all	graphics.off()	Close all figures
clc	ctrl+L	Clear console

