

Matrix — Matrix functions

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[M-5] Manual entry	Function	Purpose
Characteristics		
trace()	trace()	trace of matrix
det()	det() dettriangular()	determinant determinant of triangular matrix
norm()	norm()	matrix and vector norms
cond()	cond()	matrix condition number
rank()	rank()	rank of matrix
Bunch–Kaufman decomposition		
ldl()	ldl()	Bunch–Kaufman decomposition $A = LDL'$
Cholesky decomposition, solvers, & inverters		
cholesky()	cholesky()	Cholesky square-root decomposition $A = GG'$
cholsolve()	cholsolve() cholsolvelapacke()	solve $AX = B$ for X solve $AX = B$ for X using LAPACK routines
cholinv()	cholinv() cholinvlapacke()	inverse of positive-definite symmetric matrix inverse of positive-definite symmetric matrix using LAPACK routines
invsym()	invsym()	real symmetric matrix inversion
LU decomposition, solvers, & inverters		
lud()	lud()	LU decomposition $A = PLU$
lusolve()	lusolve()	solve $AX = B$ for X
luinv()	luinv()	inverse of square matrix

QR decomposition, solvers, & inverters

qrd()	qrd() qrdp() hqrd() hqrdp() hqrdmultq() hqrdmultq1t() hqrdq() hqrdq1() hqrdr() hqrdr1()	QR decomposition $A = QR$ QR decomposition $A = QRP'$ QR decomposition $A = f(H)R_1$ QR decomposition $A = f(H, \tau)R_1P'$ return QX or $Q'X$, $Q = f(H, \tau)$ return Q'_1X , $Q_1 = f(H, \tau)$ return $Q = f(H, \tau)$ return $Q_1 = f(H, \tau)$ return R return R_1
qrsolve()	qrsolve()	solve $AX = B$ for X
qrinv()	qrinv()	generalized inverse of matrix

Hessenberg decomposition & generalized Hessenberg decomposition

hessenbergd()	hessenbergd()	Hessenberg decomposition $T = Q'XQ$
ghessenbergd()	ghessenbergd()	generalized Hessenberg decomposition $T = Q'XQ$

Schur decomposition & generalized Schur decomposition

schurd()	schurd() schurdgroupby()	Schur decomposition $T = U'AV$; $R = U'BA$ Schur decomposition with grouping of results
gschurd()	gschurd() gschurdgroupby()	generalized Schur decomposition $T = U'AV$; $R = U'BA$ generalized Schur decomposition with grouping of results

Singular value decomposition, solvers, & inverters

svd()	svd() svdsv()	singular value decomposition $A = UDV'$ singular values s
fullsvd()	fullsvd() fullsdiag()	singular value decomposition $A = USV'$ convert s to S
svsolve()	svsolve()	solve $AX = B$ for X
pinv()	pinv()	Moore–Penrose pseudoinverse

 Triangular solvers

solverlower()	<code>solverlower()</code>	solve $AX = B$ for X , A lower triangular
	<code>solverlowerlapacke()</code>	solve $AX = B$ for X , A lower triangular using LAPACK routines
	<code>solveupper()</code>	solve $AX = B$ for X , A upper triangular
	<code>solveupperlapacke()</code>	solve $AX = B$ for X , A upper triangular using LAPACK routines

 Eigensystems, powers, & transcendental

eigensystem()	<code>eigensystem()</code>	right eigenvectors and eigenvalues
	<code>eigenvalues()</code>	eigenvalues
	<code>lefteigensystem()</code>	left eigenvectors and eigenvalues
	<code>symeigensystem()</code>	eigenvectors and eigenvalues of symmetric matrix
	<code>symeigenvalues()</code>	eigenvalues of symmetric matrix
eigensystemselect()	<code>eigensystemselect*()</code>	selected eigenvectors and eigenvalues
	etc.	
geigensystem()	<code>geigensystem()</code>	generalized eigenvectors and eigenvalues
	etc.	
matpowersym()	<code>matpowersym()</code>	powers of symmetric matrix
matexpsym()	<code>matexpsym()</code>	exponentiation of symmetric matrix
	<code>matlogsym()</code>	logarithm of symmetric matrix

 Equilibration

_equilrc()	<code>_equilrc()</code>	row/column equilibration
	<code>_equilr()</code>	row equilibration
	<code>_equilc()</code>	column equilibration
	<code>_perhapsequilrc()</code>	row/column equilibration if necessary
	<code>_perhapsequilr()</code>	row equilibration if necessary
	<code>_perhapsequilc()</code>	column equilibration if necessary
	<code>rowscalefactors()</code>	row-scaling factors for equilibration
	<code>colscalefactors()</code>	column-scaling factors for equilibration

 LAPACK

lapack()	<code>LA_*</code>	LAPACK linear-algebra functions
	<code>_flopin()</code>	convert matrix order from row major to column major
	<code>_flopout()</code>	convert matrix order from column major to row major

Description

The above functions are what most people would call mathematical matrix functions.

Remarks and examples

[stata.com](https://www.stata.com)

For other mathematical functions, see

- [M-4] [Scalar](#) Scalar mathematical functions
- [M-4] [Mathematical](#) Important mathematical functions

Also see

[M-4] [Intro](#) — Categorical guide to Mata functions