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Intro Introduction to the Mata manual

[M-1] Introduction and advice

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help Obtaining help in Stata
How How Mata works
Interactive Using Mata interactively
LAPACK Linear algebra package (LAPACK) routines
Limits Limits and memory utilization
Naming Advice on naming functions and variables
Permutation An aside on permutation matrices and vectors
Returned args Function arguments used to return results
Source Viewing the source code
Tolerance Use and specification of tolerances

[M-2] Language definition

Intro Language definition
break Break out of for, while, or do loop
class Object-oriented programming (classes)
Comments Comments
continue Continue with next iteration of for, while, or do loop
Declarations Declarations and types
do do ... while (exp)
Errors Error codes
exp Expressions
for for (exp1; exp2; exp3) stmt
ftof Passing functions to functions
goto goto label
if if (exp) ... else ...
op_arith Arithmetic operators
op_assignment Assignment operator
op_colon Colon operators
op_conditional Conditional operator
op_increment Increment and decrement operators
op_join Row- and column-join operators
op_kronecker Kronecker direct-product operator

op_logical	Logical operators
op_range	Range operators
op_transpose	Conjugate transpose operator
optargs	Optional arguments
pointers	Pointers
pragma	Suppressing warning messages
reswords	Reserved words
return	return and return(exp)
Semicolons	Use of semicolons
struct	Structures
Subscripts	Use of subscripts
Syntax	Mata language grammar and syntax
version	Version control
void	Void matrices
while	while (exp) stmt

[M-3] Commands for controlling Mata

Intro	Commands for controlling Mata
end	Exit Mata and return to Stata
lmbuild	Easily create function library
mata	Mata invocation command
mata clear	Clear Mata's memory
mata describe	Describe contents of Mata's memory
mata drop	Drop matrix or function
mata help	Obtain help in Stata
mata matsave	Save and restore matrices
mata memory	Report on Mata's memory usage
mata mlib	Create function library
mata mosave	Save function's compiled code in object file
mata rename	Rename matrix or function
mata set	Set and display Mata system parameters
mata stata	Execute Stata command
mata which	Identify function
namelists	Specifying matrix and function names

[M-4] Categorical guide to Mata functions

Intro	Categorical guide to Mata functions
Dates	Date and time functions
IO	I/O functions
Manipulation	Matrix manipulation
Mathematical	Important mathematical functions
Matrix	Matrix functions
Programming	Programming functions
Scalar	Scalar mathematical functions
Solvers	Functions to solve $AX=B$ and to obtain A inverse
Standard	Functions to create standard matrices
Stata	Stata interface functions

Statistical Statistical functions
 String String manipulation functions
 Utility Matrix utility functions

[M-5] Alphabetical index to Mata functions

Intro Alphabetical index to Mata functions
 abbrev() Abbreviate strings
 abs() Absolute value (length)
 adosubdir() Determine ado-subdirectory for file
 all() Element comparisons
 args() Number of arguments
 asarray() Associative arrays
 AssociativeArray() Associative arrays (class)
 ascii() Manipulate ASCII and byte codes
 uchar() Convert code point to Unicode character
 assert() Abort execution if false

 base64encode() Encode string into Base64 format
 blockdiag() Block-diagonal matrix
 bufio() Buffered (binary) I/O
 byteorder() Byte order used by computer

 C() Make complex
 c() Access c() value
 callersversion() Obtain version number of caller
 cat() Load file into string matrix
 chdir() Manipulate directories
 cholesky() Cholesky square-root decomposition
 cholinv() Symmetric, positive-definite matrix inversion
 cholsolve() Solve $AX=B$ for X using Cholesky decomposition
 comb() Combinatorial function
 cond() Condition number
 conj() Complex conjugate
 corr() Make correlation matrix from variance matrix
 cross() Cross products
 crossdev() Deviation cross products
 cvpermute() Obtain all permutations

 date() Date and time manipulation
 deriv() Numerical derivatives
 designmatrix() Design matrices
 det() Determinant of matrix
 _diag() Replace diagonal of a matrix
 diag() Create diagonal matrix
 diag0cnt() Count zeros on diagonal
 diagonal() Extract diagonal into column vector
 dir() File list
 direxists() Whether directory exists
 direxternal() Obtain list of existing external globals
 display() Display text interpreting SMCL

<code>displayas()</code>	Set display level
<code>displayflush()</code>	Flush terminal-output buffer
<code>Dmatrix()</code>	Duplication matrix
<code>_docx*()</code>	Generate Office Open XML (.docx) file
<code>dsign()</code>	FORTRAN-like <code>DSIGN()</code> function
<code>e()</code>	Unit vectors
<code>editmissing()</code>	Edit matrix for missing values
<code>edittoint()</code>	Edit matrix for roundoff error (integers)
<code>edittozero()</code>	Edit matrix for roundoff error (zeros)
<code>editvalue()</code>	Edit (change) values in matrix
<code>eigensystem()</code>	Eigenvectors and eigenvalues
<code>eigensystemselect()</code>	Compute selected eigenvectors and eigenvalues
<code>eltype()</code>	Element type, organizational type, and type name of object
<code>epsilon()</code>	Unit roundoff error (machine precision)
<code>_equilrc()</code>	Row and column equilibration
<code>error()</code>	Issue error message
<code>errprintf()</code>	Format output and display as error message
<code>exit()</code>	Terminate execution
<code>exp()</code>	Exponentiation and logarithms
<code>factorial()</code>	Factorial and gamma function
<code>favorspeed()</code>	Whether speed or space is to be favored
<code>ferrortext()</code>	Text and return code of file error code
<code>fft()</code>	Fourier transform
<code>fileexists()</code>	Whether file exists
<code>_fillmissing()</code>	Fill matrix with missing values
<code>findexternal()</code>	Find, create, and remove external globals
<code>findfile()</code>	Find file
<code>floatround()</code>	Round to float precision
<code>fmtwidth()</code>	Width of <code>%fmt</code>
<code>fopen()</code>	File I/O
<code>fullsvd()</code>	Full singular value decomposition
<code>geigensystem()</code>	Generalized eigenvectors and eigenvalues
<code>ghessenbergd()</code>	Generalized Hessenberg decomposition
<code>ghk()</code>	Geweke–Hajivassiliou–Keane (GHK) multivariate normal simulator
<code>ghkfast()</code>	GHK multivariate normal simulator using pregenerated points
<code>gschurd()</code>	Generalized Schur decomposition
<code>halton()</code>	Generate a Halton or Hammersley set
<code>hash1()</code>	Jenkins’s one-at-a-time hash function
<code>hessenbergd()</code>	Hessenberg decomposition
<code>Hilbert()</code>	Hilbert matrices
<code>I()</code>	Identity matrix
<code>inbase()</code>	Base conversion
<code>indexnot()</code>	Find byte not in list
<code>invorder()</code>	Permutation vector manipulation
<code>invsym()</code>	Symmetric real matrix inversion
<code>invtokens()</code>	Concatenate string rowvector into string scalar
<code>isascii()</code>	Whether string scalar contains only ASCII codes
<code>isdiagonal()</code>	Whether matrix is diagonal

isfleeing()	Whether argument is temporary
isreal()	Storage type of matrix
isrealvalues()	Whether matrix contains only real values
issamefile()	Whether two file paths are pointing to the same file
issymmetric()	Whether matrix is symmetric (Hermitian)
isview()	Whether matrix is view
J()	Matrix of constants
Kmatrix()	Commutation matrix
lapack()	Linear algebra package (LAPACK) functions
ldl()	Bunch–Kaufman decomposition
LinearProgram()	Linear programming
liststruct()	List structure’s contents
Lmatrix()	Elimination matrix
logit()	Log odds and complementary log–log
lowertriangle()	Extract lower or upper triangle
lud()	LU decomposition
luinv()	Square matrix inversion
lusolve()	Solve $AX=B$ for X using LU decomposition
makesymmetric()	Make square matrix symmetric (Hermitian)
matexpsym()	Exponentiation and logarithms of symmetric matrices
matpowersym()	Powers of a symmetric matrix
mean()	Means, variances, and correlations
mindouble()	Minimum and maximum nonmissing value
minindex()	Indices of minimums and maximums
minmax()	Minimums and maximums
missing()	Count missing and nonmissing values
missingof()	Appropriate missing value
mod()	Modulus
moptimize()	Model optimization
more()	Create –more– condition
mvnormal()	Compute multivariate normal distributions and derivatives
_negate()	Negate real matrix
norm()	Matrix and vector norms
normal()	Cumulatives, reverse cumulatives, and densities
optimize()	Function optimization
panelsetup()	Panel-data processing
panelsum()	Panel sums
pathjoin()	File path manipulation
Pdf*()	Create a PDF file
pinv()	Moore–Penrose pseudoinverse
polyeval()	Manipulate and evaluate polynomials
printf()	Format output
qrd()	QR decomposition
qrinv()	Generalized inverse of matrix via QR decomposition
qrsolve()	Solve $AX=B$ for X using QR decomposition
quadcross()	Quad-precision cross products
Quadrature()	Numerical integration

<code>range()</code>	Vector over specified range
<code>rank()</code>	Rank of matrix
<code>Re()</code>	Extract real or imaginary part
<code>reldif()</code>	Relative/absolute difference
<code>rows()</code>	Number of rows and number of columns
<code>rowshape()</code>	Reshape matrix
<code>runiform()</code>	Uniform and nonuniform pseudorandom variates
<code>runningsum()</code>	Running sum of vector
<code>schurd()</code>	Schur decomposition
<code>select()</code>	Select rows, columns, or indices
<code>setbreakintr()</code>	Break-key processing
<code>sign()</code>	Sign and complex quadrant functions
<code>sin()</code>	Trigonometric and hyperbolic functions
<code>sizeof()</code>	Number of bytes consumed by object
<code>solve_tol()</code>	Tolerance used by solvers and inverters
<code>solve_lower()</code>	Solve $AX=B$ for X , A triangular
<code>solvenl()</code>	Solve systems of nonlinear equations
<code>sort()</code>	Reorder rows of matrix
<code>soundex()</code>	Convert string to soundex code
<code>spline3()</code>	Cubic spline interpolation
<code>sqrt()</code>	Square root
<code>st_addalias()</code>	Add alias variable to current Stata dataset
<code>st_addobs()</code>	Add observations to current Stata dataset
<code>st_addvar()</code>	Add variable to current Stata dataset
<code>st_data()</code>	Load copy of current Stata dataset
<code>st_dir()</code>	Obtain list of Stata objects
<code>st_dropvar()</code>	Drop variables or observations
<code>st_frame*()</code>	Data frame manipulation
<code>st_global()</code>	Obtain strings from and put strings into global macros
<code>st_isalias()</code>	Properties of alias variable
<code>st_ismfmt()</code>	Whether valid <code>%fmt</code>
<code>st_isname()</code>	Whether valid Stata name
<code>st_local()</code>	Obtain strings from and put strings into Stata macros
<code>st_macroexpand()</code>	Expand Stata macros in string
<code>st_matrix()</code>	Obtain and put Stata matrices
<code>st_numscalar()</code>	Obtain values from and put values into Stata scalars
<code>st_nvar()</code>	Numbers of variables and observations
<code>st_rclear()</code>	Clear <code>r()</code> , <code>e()</code> , or <code>s()</code>
<code>st_store()</code>	Modify values stored in current Stata dataset
<code>st_subview()</code>	Make view from view
<code>st_tempname()</code>	Temporary Stata names
<code>st_tsrevar()</code>	Create time-series <code>op.varname</code> variables
<code>st_updata()</code>	Determine or set data-have-changed flag
<code>st_varformat()</code>	Obtain/set format, etc., of Stata variable
<code>st_varindex()</code>	Obtain variable indices from variable names
<code>st_varname()</code>	Obtain variable names from variable indices
<code>st_varrename()</code>	Rename Stata variable
<code>st_vartype()</code>	Storage type of Stata variable
<code>st_view()</code>	Make matrix that is a view onto current Stata dataset
<code>st_viewvars()</code>	Variables and observations of view

<code>st_vlexists()</code>	Use and manipulate value labels
<code>stata()</code>	Execute Stata command
<code>stataversion()</code>	Version of Stata being used
<code>strdup()</code>	String duplication
<code>strlen()</code>	Length of string in bytes
<code>ustrlen()</code>	Length of Unicode string in Unicode characters
<code>udstrlen()</code>	Length of Unicode string in display columns
<code>strmatch()</code>	Determine whether string matches pattern
<code>strofreal()</code>	Convert real to string
<code>strpos()</code>	Find substring in string
<code>ustrpos()</code>	Find substring in Unicode string
<code>strreverse()</code>	Reverse string
<code>ustrreverse()</code>	Reverse Unicode string
<code>strtoname()</code>	Convert a string to a Stata 13 compatible name
<code>ustrtoname()</code>	Convert a Unicode string to a Stata name
<code>strtoreal()</code>	Convert string to real
<code>strtrim()</code>	Remove blanks
<code>ustrtrim()</code>	Remove Unicode whitespace characters
<code>strupper()</code>	Convert ASCII letter to uppercase (lowercase)
<code>ustrupper()</code>	Convert Unicode string to uppercase, lowercase, or titlecase
<code>substr()</code>	Substitute text
<code>usubstr()</code>	Replace Unicode substring
<code>sublowertriangle()</code>	Return a matrix with zeros above a diagonal
<code>_substr()</code>	Substitute into string
<code>_usubstr()</code>	Substitute into Unicode string
<code>substr()</code>	Extract substring
<code>usubstr()</code>	Extract Unicode substring
<code>udsubstr()</code>	Extract Unicode substring based on display columns
<code>sum()</code>	Sums
<code>svd()</code>	Singular value decomposition
<code>svsolve()</code>	Solve $AX=B$ for X using singular value decomposition
<code>swap()</code>	Interchange contents of variables
<code>Toeplitz()</code>	Toeplitz matrices
<code>tokenget()</code>	Advanced parsing
<code>tokens()</code>	Obtain tokens from string
<code>trace()</code>	Trace of square matrix
<code>_transpose()</code>	Transposition in place
<code>transposeonly()</code>	Transposition without conjugation
<code>trunc()</code>	Round to integer
<code>uniqrows()</code>	Obtain sorted, unique values
<code>unitcircle()</code>	Complex vector containing unit circle
<code>unlink()</code>	Erase file
<code>urlencode()</code>	Convert URL into percent-encoded ASCII format
<code>ustrcompare()</code>	Compare or sort Unicode strings
<code>ustrfix()</code>	Replace invalid UTF-8 sequences in Unicode string
<code>ustrnormalize()</code>	Normalize Unicode string
<code>ustrsplit()</code>	Split string into parts based on a Unicode regular expression
<code>ustrto()</code>	Convert a Unicode string to or from a string in a specified encoding
<code>ustrunescape()</code>	Convert escaped hex sequences to Unicode strings
<code>ustrword()</code>	Obtain Unicode word from Unicode string

valofexternal() Obtain value of external global
Vandermonde() Vandermonde matrices
vec() Stack matrix columns
xl() Excel file I/O class

[M-6] Mata glossary of common terms

Glossary
Subject and author index

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