Package 'matlab'

May 20, 2022

Version 1.0.3

Date 2022-05-20

Title Emulation of MATLAB Mathematical Software

Maintainer Vincent T van Hees <v.vanhees@accelting.com>

Description Emulate MATLAB Code Using R.

Depends R (>= 2.15)

Imports methods, graphics

URL https://cran.r-project.org/package=matlab

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LazyLoad true

NeedsCompilation no

R topics documented:

`matlab-package` *MATLAB Emulation Functions*

Description

Wrapper functions and variables used to replicate MATLAB function calls as best possible to simplify porting.

Details

Package:	matlab
Type:	Package
Version:	1.0.3
Date:	2022-05-20
License:	Artistic-2.0

They are no more complete than absolutely necessary and are quite possibly broken for fringe cases.

For a complete list of functions, use `library(help="matlab")`.
For a high-level summary of the changes for each revision, use `file.show(system.file("NEWS", package="matlab"))`.

Note

In certain cases, these may not correspond exactly with MATLAB API as sometimes it just wasn't possible.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

`ceil` *MATLAB ceil function*

Description

Rounds to the nearest integer.

Usage

```
ceil(x)
```

Arguments

`x`	numeric to be rounded

Details

Simply invokes `ceiling` for those more used to C library API name.

Value

Returns numeric vector containing smallest integers not less than the corresponding elements of argument `x`.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

`fix`, `Round`

Examples

```
ceil(c(0.9, 1.3, 2.4))
```

cell *MATLAB cell function*

Description

Create cell array.

Usage

```
cell(...)
```

Arguments

...	numeric dimensions for the result

Value

Returns list consisting of empty matrices. Defaults to square if dimension argument resolves to a single value.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

ones, zeros

Examples

```
cell(3)
cell(c(3, 3)) # same thing
cell(3, 3) # same thing
cell(size(matrix(NA, 3, 3))) # same thing
```

colorbar *MATLAB colorbar function*

Description

Displays colorbar showing the color scale.

Usage

```
colorbar(C, location=c("EastOutside", "WestOutside", "NorthOutside", "SouthOutside"), ...)
```

Arguments

C	numeric vector or matrix representing data values
location	character scalar indicating desired orientation with respect to the axes
...	graphical parameters for image may also be passed as arguments to this method

Details

The values of the elements of C are indices into the current palette that determine the color of each patch.

This implementation differs a bit from its MATLAB counterpart in that the values must be passed explicitly.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

imagesc, jet.colors, layout, par

Examples

```
doPlot <- function(C,
                   cb.loc=c("EastOutside",
                            "WestOutside",
                            "NorthOutside",
                            "SouthOutside"),
                   ...) {
    saved.par <- par(no.readonly=TRUE)
    on.exit(par(saved.par))

    layout.EO <- function() {
        ## divide the device into one row and nine columns
        ## allocate figure 1 the first eight columns
        ## allocate figure 2 the last column
        layout(matrix(c(1, 1, 1, 1, 1, 1, 1, 1, 2), ncol=9))
    }

    layout.WO <- function() {
        ## divide the device into one row and nine columns
        ## allocate figure 1 the last eight columns
        ## allocate figure 2 the first column
        layout(matrix(c(2, 1, 1, 1, 1, 1, 1, 1, 1), ncol=9))
    }

    layout.NO <- function() {
        ## divide the device into six rows and one column
        ## allocate figure 1 the last five rows
        ## allocate figure 2 the first row
        layout(matrix(c(2, 1, 1, 1, 1, 1), nrow=6))
```

```
    }

    layout.SO <- function() {
        ## divide the device into six rows and one column
        ## allocate figure 1 the first five rows
        ## allocate figure 2 the last row
        layout(matrix(c(1, 1, 1, 1, 1, 2), nrow=6))
    }

    location <- match.arg(cb.loc)
    switch(EXPR=location,
           EastOutside  = layout.EO(),
           WestOutside  = layout.WO(),
           NorthOutside = layout.NO(),
           SouthOutside = layout.SO())

    imagesc(C, ...)
    colorbar(C, location, ...)
}

values <- matrix(c(seq(1,  5, by=1),
                   seq(2, 10, by=2),
                   seq(3, 15, by=3)), nrow=3, byrow=TRUE)

dev.new(width=8, height=7)
doPlot(values, "EastOutside", col=jet.colors(16))
```

---

eye *MATLAB eye function*

Description

Create an identity matrix.

Usage

```
eye(m, n)
```

Arguments

m, n	numeric scalar specifying dimensions for the result

Value

Returns matrix of order 1. Defaults to square if second dimension argument n not provided.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

ones, zeros

Examples

```
eye(3)
```

`factors` *MATLAB factor function*

Description

Performs prime factorization.

Usage

```
factors(n)
```

Arguments

n	numeric scalar specifying composite number to be factored

Details

Computes the prime factors of n in ascending order, each one as often as its multiplicity requires, such that n == prod(factors(n)).

Value

Returns vector containing the prime factors of n.

Note

The corresponding MATLAB function is called 'factor', but was renamed here to avoid conflict with R's compound object class.

Author(s)

H. Borchers <hwborchers@googlemail.com>, P. Roebuck <proebuck@mdanderson.org>

See Also

isprime, primes

Examples

```
factors(1002001)       # 7  7  11  11  13  13
factors(65537)         # is prime
## Euler's calculation
factors(2^32 + 1)      # 641  6700417
```

`fileparts` *MATLAB fileparts function*

Description

Return filename parts.

Usage

```
fileparts(pathname)
```

Arguments

`pathname`	character string representing pathname to be parsed

Details

Determines the path, filename, extension, and version for the specified file. The returned `ext` contains a dot (.) before the file extension. The returned `versn` is always an empty string as the field is provided for compatibility with its namesake's results.

Value

Returns a list with components:

`pathstr`	character string representing directory path
`name`	character string representing base of file name
`ext`	character string representing file extension
`versn`	character string representing version. Unused

Note

Returns same insane results as does its namesake when handling relative directories, UNIX hidden files, and tilde expansion. Hidden files are returned with `name` containing a zero length vector and `ext` containing the actual name. For best results, use this routine to process files, not directories.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

`fullfile`

Examples

```
## Rename dot-txt file as dot-csv
ans <- fileparts("/home/luser/foo.txt")
fullfile(ans$pathstr, paste(ans$name, "csv", sep="."))   # /home/luser/foo.csv
```

filesep *MATLAB filesep function*

Description

Returns the character that separates directory names in filenames.

Usage

```
filesep
```

Details

Variable that contains the value of `.Platform$file.sep`.

Value

Returns character representing this platform's file separator.

Note

Implemented as an R variable rather than a function such that it more closely resembles normal MATLAB usage.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

`fileparts`, `fullfile`, `pathsep`

find *MATLAB find function*

Description

Finds indices of elements.

Usage

```
find(x)
```

Arguments

x	expression to evaluate

Details

If expression is not logical, finds indices of nonzero elements of argument x.

Value

Returns indices of corresponding elements matching the expression x.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

Examples

```
find(-3:3 >= 0)
find(c(0, 1, 0, 2, 3))
```

---

fix *MATLAB fix function*

Description

Rounds toward zero.

Usage

```
fix(A)
```

Arguments

A	numeric to be rounded

Details

Simply invokes trunc.

Value

Returns vector containing integers by truncating the corresponding values of argument A toward zero.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

ceil, Round

Examples

```
fix(c(1.3, 2.5, 3.7))
```

`fliplr` *MATLAB matrix flip functions*

Description

Flips matrices either left-right or up-down.

Usage

```
fliplr(object)
flipud(object)
```

Arguments

`object`	vector or matrix to be flipped

Details

These are S4 generic functions.

Value

Return value is the same type as argument `object`.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

`rot90`

Examples

```
fliplr(1:9)
flipud(1:9) # same as previous since vectors have no orientation in R
fliplr(matrix(1:9, 3, 3, byrow=TRUE))
flipud(matrix(1:9, 3, 3, byrow=TRUE))
```

`fullfile` *MATLAB fullfile function*

Description

Contructs path to a file from components in platform-independent manner

Usage

```
fullfile(...)
```

Arguments

`...`	character strings representing path components

Details

Builds a full filename from the directories and filename specified. This is conceptually equivalent to

```
paste(dir1, dir2, dir3, filename, sep=filesep)
```

with care taken to handle cases when directories begin or end with a separator.

Value

Returns character vector of arguments concatenated term-by-term and separated by file separator if all arguments have a positive length; otherwise, an empty character vector.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

`fileparts`, `filesep`

Examples

```
fullfile("", "etc", "profile") # /etc/profile
```

hilb *MATLAB hilb function*

Description

Create a Hilbert matrix.

Usage

```
hilb(n)
```

Arguments

n	numeric scalar specifying dimensions for the result

Details

The Hilbert matrix is a notable example of a poorly conditioned matrix. Its elements are

```
H[i, j] = 1 / (i + j - 1)
```

.

Value

Returns an n-by-n matrix constructed as described above.

Author(s)

H. Borchers <hwborchers@googlemail.com>, P. Roebuck <proebuck@mdanderson.org>

Examples

```
hilb(3)
```

imagesc *MATLAB imagesc function*

Description

Scales image data to the full range of the current palette and displays the image.

Usage

```
imagesc(x=seq(ncol(C)), y=seq(nrow(C)), C, col=jet.colors(12), ...)
```

Arguments

x,y	locations of grid lines at which the values in C are measured. These must be finite, non-missing and in (strictly) ascending order. By default, the dimensions of C are used.
C	numeric matrix representing data to be plotted. Note that x can be used instead of C for convenience.
col	vector of colors used to display image data
...	graphical parameters for image may also be passed as arguments to this method

Details

Each element of C corresponds to a rectangular area in the image. The values of the elements of C are indices into the current palette that determine the color of each patch.

The method interprets the matrix data as a table of f(x[i], y[j]) values, so that the x axis corresponds to column number and the y axis to row number, with row 1 at the top, i.e., the same as the conventional printed layout of a matrix.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

image, jet.colors, par

Examples

```
values <- matrix(c(seq(1,  5, by=1),
                   seq(2, 10, by=2),
                   seq(3, 15, by=3)), nrow=3, byrow=TRUE)
imagesc(values, xlab="cols", ylab="rows", col=jet.colors(16))
```

---

isempty *MATLAB isempty function*

Description

Determine if object is empty.

Usage

```
isempty(A)
```

Arguments

A	object to evaluate

Details

An empty object has at least one dimension of size zero.

Value

Returns TRUE if x is an empty object; otherwise, FALSE.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

Examples

```
isempty(1:3)  # FALSE
isempty(array(NA, c(2, 0, 2))) # TRUE
```

---

isprime *MATLAB isprime function*

Description

Array elements that are prime numbers.

Usage

```
isprime(x)
```

Arguments

x	numeric vector or matrix containing nonnegative integer values

Value

Returns an array (or vector) the same size as x containing logical 1 (true) for the elements of x which are prime, and logical 0 (false) otherwise.

Author(s)

H. Borchers <hwborchers@googlemail.com>, P. Roebuck <proebuck@mdanderson.org>

See Also

factors, primes

Examples

```
x <- c(2, 3, 0, 6, 10)
ans  <- isprime(x) ## 1, 1, 0, 0, 0
as.logical(ans)         ## true, true, false, false, false
```

jet.colors *MATLAB jet function*

Description

Creates a vector of n colors beginning with dark blue, ranging through shades of blue, cyan, green, yellow and red, and ending with dark red.

Usage

```
jet.colors(n)
```

Arguments

n	numeric scalar specifying number of colors to be in the palette

Value

Returns vector of n color names. This can be used either to create a user-defined color palette for subsequent graphics, a col= specification in graphics functions, or in par.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

palette, par, rgb

Examples

```
require(graphics)
x <- 1:16
pie(x, col=jet.colors(length(x)))
```

linspace *MATLAB linspace function*

Description

Generate linearly spaced vectors.

Usage

```
linspace(a, b, n=100)
```

Arguments

a	numeric scalar specifying starting point
b	numeric scalar specifying ending point
n	numeric scalar specifying number of points to be generated

Details

Similar to colon operator but gives direct control over the number of points. Note also that although MATLAB doesn't specifically document this, the number of points generated is actually `floor(n)`.

Value

Returns vector containing containing `n` points linearly spaced between `a` and `b` inclusive. If $n < 2$, the result will be the ending point `b`.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

logspace

Examples

```
linspace(1, 10, 4)
```

---

logspace *MATLAB logspace function*

Description

Generate logarithmically spaced vectors.

Usage

```
logspace(a, b, n=50)
```

Arguments

a	numeric scalar specifying exponent for starting point
b	numeric scalar specifying exponent for ending point
n	numeric scalar specifying number of points to be generated

Details

Useful for creating frequency vectors, it is a logarithmic equivalent of `linspace`.

Value

Returns vector containing containing n points logarithmically spaced between decades 10^a and 10^b. For $n < 2$, b is returned.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

linspace

Examples

```
logspace(1, pi, 36)
```

---

magic *MATLAB magic function*

Description

Create a magic square.

Usage

```
magic(n)
```

Arguments

n	numeric scalar specifying dimensions for the result

Details

The value of the characteristic sum for a magic square of order n is $sum(1 : n^2)/n$. The order n must be a scalar greater than or equal to 3; otherwise, the result will be either a nonmagic square, or else the degenerate magic squares 1 and [].

Value

Returns an n-by-n matrix constructed from the integers 1 through N^2 with equal row and column sums.

Note

A magic square, scaled by its magic sum, is doubly stochastic.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

ones, zeros

Examples

```
magic(3)
```

`meshgrid` *MATLAB meshgrid functions*

Description

Generate X and Y matrices for three-dimensional plots.

Usage

```
meshgrid(x, y, z, nargout=2)
```

Arguments

`x, y, z`	numeric vectors of values
`nargout`	numeric scalar that determines number of dimensions to return

Details

In the first example below, the domain specified by vectors `x` and `y` are transformed into two arrays which can be used to evaluate functions of two variables and three-dimensional surface plots. The rows of the output array `x` are copies of the vector `x`; columns of the output array `y` are copies of the vector `y`.

The second example below is syntactic sugar for specifying `meshgrid(x, x)`.

The third example below produces three-dimensional arrays used to evaluate functions of three variables and three-dimensional volumetric plots.

Value

Returns list containing eiher two or three matrices depending on the value of `nargout`.

`x, y, z`	output matrices

Note

Limited to two- or three-dimensional Cartesian space.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

Examples

```
meshgrid(1:3, 10:14)            # example 1
meshgrid(1:3)                   # example 2
meshgrid(5:8, 10:14, 2:3, 3)    # example 3
```

---

mod *MATLAB mod/rem functions*

Description

Provides modulus and remainder after division.

Usage

```
mod(x, y)
rem(x, y)
```

Arguments

x, y	numeric vectors or objects

Value

Returns vector containing result of the element by element operations.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

Examples

```
## same results with x, y having the same sign
mod(5, 3)
rem(5, 3)
## same results with x, y having different signs
mod(-5, 3)
rem(-5, 3)
```

`multiline.plot.colors` *MATLAB multiline plot colors*

Description

Creates a vector of colors equivalent to MATLAB's default colors to use for multiline plots.

Usage

```
multiline.plot.colors()
```

Details

This is equivalent to the MATLAB command

```
get(gca, 'ColorOrder')
```

Value

Returns vector of color names. This can be used either to create a user-defined color palette for subsequent graphics, a `col=` specification in graphics functions, or in `par`.

Note

Method should be considered experimental and will most likely be removed and replaced with similar functionality in the near future.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

`palette`, `par`, `rgb`

Examples

```
require(graphics)
x <- matrix(1:16, nrow=2, byrow=TRUE)
matplot(x, type="l", col=multiline.plot.colors())
```

ndims *MATLAB ndims function*

Description

Provides number of array dimensions.

Usage

```
ndims(A)
```

Arguments

A	object of which to determine the number of dimensions

Details

Simply invokes `length(size(A))`.

Value

Returns the number of dimensions in the array A.

Note

The number of dimensions is always greater than or equal to 2. Initial implementation returned `length`.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

`size`

Examples

```
ndims(2:9) # 2
ndims(magic(4)) # 2
ndims(array(1:8, c(2,2,2))) # 3
```

nextpow2 *MATLAB nextpow2 function*

Description

Smallest power of 2 greater than or equal to its argument.

Usage

```
nextpow2(x)
```

Arguments

x	numeric or complex value(s).

Details

Computes the smallest power of two that is greater than or equal to the absolute value of x. (That is, p that satisfies $2^p \geq abs(x)$). For negative or complex values, the absolute value will be taken.

Value

Returns numeric result containing integer p as described above. Nonscalar input returns an element-by-element result (of same size/dimensions as its input).

Author(s)

H. Borchers <hwborchers@googlemail.com>, P. Roebuck <proebuck@mdanderson.org>

See Also

pow2

Examples

```
nextpow2(10)                  # 4
nextpow2(1:10)                # 0 1 2 2 3 3 3 3 4 4
nextpow2(-2^10)               # 10
nextpow2(.Machine$double.eps) # -52
nextpow2(c(0.5, 0.25, 0.125)) # -1 -2 -3
```

numel *MATLAB numel function*

Description

Provides number of elements in array `A` or subscripted array expression.

Usage

```
numel(A, varargin)
```

Arguments

`A`	object of which to determine the number of elements
`varargin`	unimplemented

Value

Returns `prod(size(A))`.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

`prod`, `size`

Examples

```
numel(2:9) # 8
numel(magic(4)) # 16
```

ones *MATLAB ones/zeros functions*

Description

Create a matrix consisting of all ones or zeros.

Usage

```
ones(...)
zeros(...)
```

Arguments

...	numeric dimensions for the result

Value

Returns matrix consisting only of ones (or zeros). Defaults to square if dimension argument resolves to a single value.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

eye

Examples

```
ones(3)
ones(c(3, 3))                   # same thing
ones(3, 3)                      # same thing
ones(size(matrix(NA, 3, 3)))    # same thing
zeros(3)
```

---

padarray *MATLAB padarray function*

Description

Pad array.

Usage

```
padarray(A, padsize, padval=0, direction=c("both", "pre", "post"))
```

Arguments

A	vector, matrix, or array to be padded
padsize	integer vector specifying both amount of padding and the dimension along which to add it
padval	scalar value specifying pad value, which defaults to 0. Instead, it may specify the method used to determine pad values. Valid values for the method are:

"circular"	pad with circular repetition of elements within the dimension
"replicate"	pad by repeating border elements of array
"symmetric"	pad array with mirror reflections of itself

direction	character string specifying direction to apply padding. Valid values are:
"both"	pad before first element and after last array element along each dimension
"pre"	pad after last array element along each dimension
"post"	pad before first array element along each dimension

Details

This is an S4 generic function.

Value

Return value is the same type as argument A with requested padding.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

Examples

```
padarray(1:4, c(0, 2)) # 0 0 [1 2 3 4] 0 0
padarray(1:4, c(0, 2), -1) # -1 -1 [1 2 3 4] -1 -1
padarray(1:4, c(0, 2), -1, "post") # [1 2 3 4] -1 -1
padarray(1:4, c(0, 3), "symmetric", "pre") # 3 2 1 [1 2 3 4]
padarray(letters[1:5], c(0, 3), "replicate") # a a a [a b c d e] e e e
padarray(letters[1:5], c(0, 3), "circular", "post") # [a b c d e] a b c
```

---

pascal *MATLAB pascal function*

Description

Generate Pascal matrix.

Usage

```
pascal(n, k=0)
```

Arguments

n	numeric scalar specifying order
k	numeric scalar specifying desired option. Valid values are 0, 1, or 2

Details

Specifying $k = 0$ returns symmetric positive definite matrix with integer entries taken from Pascal's triangle.

Specifying $k = 1$ returns the lower triangular Cholesky factor (up to the signs of the columns) of the Pascal matrix.

Specifying $k = 2$ returns a cube root of the identity matrix.

Value

Returns matrix of order `n` according to specified option `k`.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

Examples

```
pascal(4)
pascal(3, 2)
```

---

pathsep *MATLAB pathsep function*

Description

Returns the character that separates directory names in a list such as the `PATH` environment variable.

Usage

```
pathsep
```

Details

Variable that contains the value of `.Platform$path.sep`.

Value

Returns character representing this platform's path separator.

Note

Implemented as an R variable rather than a function such that it more closely resembles normal MATLAB usage.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

filesep

---

pow2 *MATLAB pow2 function*

Description

Power with base 2.

Usage

```
pow2(f, e)
```

Arguments

f	numeric vector of factors
e	numeric vector of exponents for base 2

Details

Computes the expression `f * 2^e` for corresponding elements of `f` and `e`. If `e` is missing, it sets `e` to `f` and `f` to 1. Imaginary parts of complex values are ignored unless `e` is missing.

Value

Returns numeric vector constructed as described above.

Author(s)

H. Borchers <hwborchers@googlemail.com>, P. Roebuck <proebuck@mdanderson.org>

See Also

nextpow2

Examples

```
pow2(c(0, 1, 2, 3))               # 1 2 4 8
pow2(c(0, -1, 2, 3), c(0,1,-2,3)) # 0.0 -2.0  0.5 24.0
pow2(1i)                          # 0.7692389+0.6389613i

# For IEEE arithmetic...
pow2(1/2, 1)                      # 1
pow2(pi/4, 2)                     # pi
pow2(-3/4, 2)                     # -3
pow2(1/2, -51)                    # .Machine$double.eps
pow2(1/2, -1021)                  # .Machine$double.xmin
```

primes *MATLAB primes function*

Description

Generate a list of prime numbers.

Usage

```
primes(n)
```

Arguments

n	scalar numeric specifying largest prime number desired.

Details

Generates the list of prime numbers less than or equal to n using a variant of the basic "Sieve of Eratosthenes" algorithm. This approach is reasonably fast, but requires a copious amount of memory when n is large. A prime number is one that has no other factors other than 1 and itself.

Value

Returns numeric vector containing prime numbers less than or equal to argument n.

Author(s)

H. Borchers <hwborchers@googlemail.com>, P. Roebuck <proebuck@mdanderson.org>

See Also

isprime, factors

Examples

```
primes(1000)
length(primes(1e6))    #   78498 prime numbers less than one million
## Not run:
  length(primes(1e7))  #  664579 prime numbers less than ten million
  length(primes(1e8))  # 5761455 prime numbers less than one hundred million

## End(Not run)
```

repmat *MATLAB repmat function*

Description

Replicate and tile a matrix.

Usage

```
repmat(A, ...)
```

Arguments

A	vector or matrix to be tiled. Must be numeric, logical, complex or character.
...	numeric dimensions for the result

Value

Returns matrix with value A tiled to the number of dimensions specified. Defaults to square if dimension argument resolves to a single value.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

ones, zeros

Examples

```
repmat(1, 3)                      # same as ones(3)
repmat(1, c(3, 3))                # same thing
repmat(1, 3, 3)                   # same thing
repmat(1, size(matrix(NA, 3, 3)))  # same thing
repmat(matrix(1:4, 2, 2), 3)
```

reshape *MATLAB reshape function*

Description

Reshape matrix or array.

Usage

```
reshape(A, ...)
```

Arguments

A	matrix or array containing the original data
...	numeric dimensions for the result

Details

In the first example below, an m-by-n matrix is created whose elements are taken column-wise from A. An error occurs if A does not have $m * n$ elements.

In the second example below, an n-dimensional array with the same elements as A but reshaped to have the size m-by-n-by-p. The product of the specified dimensions must be the same as `prod(size(A))`.

In the third example below, an n-dimensional array with the same elements as A but reshaped to siz, a vector representing the dimensions of the reshaped array. The quantity `prod(siz)` must be the same as `prod(size(A))`.

Value

Returns matrix (or array) of requested dimensions containing the elements of A.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

Examples

```
Xmat.2d <- matrix(1:12, nrow=4, ncol=3)
reshape(Xmat.2d, 6, 2)                  # example 1
reshape(Xmat.2d, c(6, 2))                   # same thing
Xarr.3d <- reshape(Xmat.2d, c(6, 2, 1))  # example 2
reshape(Xmat.2d, size(Xarr.3d))          # example 3
```

rosser *MATLAB rosser function*

Description

Create the Rosser matrix, a classic symmetric eigenvalue test problem.

Usage

```
rosser()
```

Details

The returned matrix has the following features:

- a double eigenvalue
- three nearly equal eigenvalues
- dominant eigenvalues of opposite sign
- a zero eigenvalue
- a small, nonzero eigenvalue

Value

Returns an 8-by-8 matrix with integer elements.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

Examples

```
rosser()
```

rot90 *MATLAB rot90 function*

Description

Rotates matrix counterclockwise k*90 degrees.

Usage

```
rot90(A, k=1)
```

Arguments

A	matrix to be rotated
k	numeric scalar specifying the number of times to rotate (1..4)

Details

Rotating 4 times (360 degrees) returns the original matrix unchanged.

Value

Returns matrix corresponding to argument A having been rotated argument k number of times.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

See Also

fliplr, flipud

Examples

```
rot90(matrix(1:4, 2, 2))
```

---

size *MATLAB size function*

Description

Provides dimensions of X.

Usage

```
size(X, dimen)
```

Arguments

X	vector, matrix, or array object
dimen	numeric scalar specifies particular dimension

Details

This is an S4 generic function. Vector will be treated as a single row matrix. Stored value is equivalent to dim.

Value

Returns object of class `size_t` containing the dimensions of input argument `X` if invoked with a single argument. Returns integer value of specified dimension if invoked with two arguments. If `dimen` specifies a higher dimension than exists, returns 1 representing the singleton dimension.

Note

Handling of vectors is different than in initial implementation. Initial implementation returned `length`.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

Examples

```
size(2:9) # 1 8
size(matrix(1:8, 2, 4)) # 2 4
size(matrix(1:8, 2, 4), 2) # 4
size(matrix(1:8, 2, 4), 3) # 1
```

---

size_t-class *Class "size_t"*

Description

This class represents the dimensions of another R object

Objects from the Class

Objects can be created by calls of the form `new("size_t", ...)`. Use of generator method is preferred.

Slots

`.Data`**:** object of class `"integer"` containing size values

Extends

Class `"integer"`, from data part. Class `"vector"`, by class `"integer"`. Class `"numeric"`, by class `"integer"`.

Note

Internal class supporting `size`.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

std *MATLAB std function*

Description

Computes the standard deviation of the values of `x`.

Usage

```
std(x, flag=0)
```

Arguments

`x`	numeric vector or matrix
`flag`	numeric scalar. If `0`, selects unbiased algorithm. If `1`, selects biased algorithm (currently unsupported).

Details

Simply invokes `sd`.

Value

Return value depends on argument `x`. If vector, returns the standard deviation. If matrix, returns vector containing the standard deviation of each column.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

Examples

```
std(1:2) ^ 2
```

strcmp *MATLAB strcmp function*

Description

Compare strings.

Usage

```
strcmp(S, T)
```

Arguments

S, T	character vectors to evaluate

Details

Comparisons are case-sensitive and any leading and trailing blanks in either of the strings are explicitly included in the comparison.

Value

Returns TRUE if S is identical to T; otherwise, FALSE.

Note

Value returned is the opposite of the C language convention.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

Examples

```
strcmp("foo", "bar")  # FALSE
strcmp(c("yes", "no"), c("yes", "no")) # TRUE
```

---

sum *MATLAB sum function*

Description

Provides sum of elements.

Usage

```
sum(x, na.rm=FALSE)
```

Arguments

x	numeric or logical to be summed
na.rm	logical scalar. If TRUE, remove missing values

Details

This is an S4 generic function.

Value

Return value depends on argument x. If vector, returns the same as sum. If matrix, returns vector containing the sum of each column.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

Examples

```
sum(1:9)
sum(matrix(1:9, 3, 3))
```

---

tictoc *MATLAB timer functions*

Description

Provides stopwatch timer. Function `tic` starts the timer and `toc` updates the elapsed time since the timer was started.

Usage

```
tic(gcFirst=FALSE)
toc(echo=TRUE)
```

Arguments

`gcFirst`	logical scalar. If `TRUE`, perform garbage collection prior to starting stopwatch
`echo`	logical scalar. If `TRUE`, print elapsed time to screen

Details

Provides analog to `system.time`. Function `toc` can be invoked multiple times in a row.

Author(s)

P. Roebuck <proebuck@mdanderson.org>

Examples

```
tic()
for(i in 1:100) mad(runif(1000)) # kill time
toc()
```

vander *MATLAB vander function*

Description

Generate Vandermonde matrix from a vector of numbers.

Usage

```
vander(v)
```

Arguments

v	numeric or complex vector of values

Details

Generates the Vandermonde matrix whose columns are powers of the vector v (of length n) using the formula

```
A[i, j] = v[i]^(n-j)
```

Used when fitting a polynomial to given points.

Value

Returns an n-by-n matrix constructed as described above.

Author(s)

H. Borchers <hwborchers@googlemail.com>, P. Roebuck <proebuck@mdanderson.org>

Examples

```
vander(1:5)
```

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