Title

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diag( ) — Create diagonal matrix

Syntax

numeric matrix `diag(`*numeric matrix Z*`)`

numeric matrix `diag(`*numeric vector z*`)`

Description

`diag()` creates diagonal matrices.

`diag(`*Z*`)`, *Z* a matrix, extracts the principal diagonal of *Z* to create a new matrix. *Z* must be square.

`diag(`*z*`)`, *z* a vector, creates a new matrix with the elements of *z* on its diagonal.

Remarks and examples

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Do not confuse `diag()` with its functional inverse, `diagonal()`; see [M-5] **diagonal( )**. `diag()` creates a matrix from a vector (or matrix); `diagonal()` extracts the diagonal of a matrix into a vector.

Use of `diag()` should be avoided because it wastes memory. The colon operators will allow you to use vectors directly:

Desired calculation	Equivalent
`diag(`*v*`)*`*X*,	
v is a column	*v*`:*`*X*
v is a row	*v*`':*`*X*
v is a matrix	`diagonal(`*v*`):*`*X*
X`*diag(`*v*`)`	
v is a column	*X*`:*`*v*′
v is a row	*X*`:*`*v*
v is a matrix	*X*`:*diagonal(`*v*`)′`

In the above table, it is assumed that *v* is real. If *v* might be complex, the transpose operators that appear must be changed to `transposeonly()` calls, because we do not want the conjugate. For instance, *v*`':*`*X* would become `transposeonly(`*v*`):*`*X*.

Conformability

`diag(`Z`)`:

Z:	$m \times n$
result:	$\min(m, n) \times \min(m, n)$

`diag(`z`)`:

z:	$1 \times n$ or $n \times 1$
result:	$n \times n$

Diagnostics

None.

Also see

[M-5] **_diag( )** — Replace diagonal of a matrix

[M-5] **diagonal( )** — Extract diagonal into column vector

[M-5] **isdiagonal( )** — Whether matrix is diagonal

[M-4] **manipulation** — Matrix manipulation