

**diag()** — Create diagonal matrix

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## 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.

## Syntax

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

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

## Remarks and examples

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
<code>diag(v)*X</code> ,	
$v$ is a column	<code>v:*X</code>
$v$ is a row	<code>v':*X</code>
$v$ is a matrix	<code>diagonal(v):*X</code>
 <code>X*diag(v)</code>	
$v$ is a column	<code>X:*v'</code>
$v$ is a row	<code>X:*v</code>
$v$ is a matrix	<code>X:*diagonal(v)'</code>

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

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