Title

> **diag( ) —** Create diagonal matrix

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
diag(v)∗X,	
$\quad v$ is a column	v:∗X
$\quad v$ is a row	v':∗X
$\quad v$ is a matrix	diagonal(v):∗X
X∗diag(v)	
$\quad v$ is a column	X:∗v'
$\quad v$ is a row	X:∗v
$\quad v$ 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):

$$
\begin{aligned}
Z: & \quad m \times n \\
\mathit{result}: & \quad \min(m, n) \times \min(m, n)
\end{aligned}
$$

diag(z):

$$
\begin{aligned}
z: & \quad 1 \times n \quad \text{or} \quad n \times 1 \\
\mathit{result}: & \quad n \times n
\end{aligned}
$$

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