

## Dmatrix() — Duplication matrix

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## Description

`Dmatrix(n)` returns the  $n^2 \times n(n+1)/2$  duplication matrix  $D$  for which  $D*\text{vech}(X) = \text{vec}(X)$ , where  $X$  is an arbitrary  $n \times n$  symmetric matrix.

## Syntax

*real matrix* `Dmatrix(real scalar n)`

## Remarks and examples

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Duplication matrices are frequently used in computing derivatives of functions of symmetric matrices. Section 9.5 of [Lütkepohl \(1996\)](#) lists many useful properties of duplication matrices.

## Conformability

`Dmatrix(n)`:  
     *n*:         $1 \times 1$   
     *result*:    $n^2 \times n(n+1)/2$

## Diagnostics

`Dmatrix(n)` aborts with error if  $n$  is less than 0 or is missing.  $n$  is interpreted as `trunc(n)`.

## Reference

Lütkepohl, H. 1996. *Handbook of Matrices*. New York: Wiley.

## Also see

[M-5] [Kmatrix\(\)](#) — Commutation matrix

[M-5] [Lmatrix\(\)](#) — Elimination matrix

[M-5] [vec\(\)](#) — Stack matrix columns

[M-4] [Standard](#) — Functions to create standard matrices