Dmatrix() — Duplication matrix

Description

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

Syntax

\[ \text{real matrix Dmatrix(real scalar n)} \]

Remarks and examples

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

\[ \text{Dmatrix}(n): \]

\[ \begin{array}{c}
  n: \ 1 \times 1 \\
  \text{result: } n^2 \times n(n+1)/2
\end{array} \]

Diagnostics

Dmatrix(n) aborts with error if \( n \) is less than 0 or is missing. \( n \) is interpreted as \( \text{trunc}(n) \).

Reference


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