

**Kmatrix()** — Commutation matrix

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## Description

`Kmatrix(m, n)` returns the  $mn \times mn$  commutation matrix  $K$  for which  $K \cdot \text{vec}(X) = \text{vec}(X')$ , where  $X$  is an  $m \times n$  matrix.

## Syntax

*real matrix* `Kmatrix(real scalar m, real scalar n)`

## Remarks and examples

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Commutation matrices are frequently used in computing derivatives of functions of matrices. Section 9.2 of [Lütkepohl \(1996\)](#) lists many useful properties of commutation matrices.

## Conformability

`Kmatrix(m, n):`  
 $m:$      $1 \times 1$   
 $n:$      $1 \times 1$   
 $result:$      $mn \times mn$

## Diagnostics

`Kmatrix(m, n)` aborts with error if either  $m$  or  $n$  is less than 0 or is missing.  $m$  and  $n$  are interpreted as `trunc(m)` and `trunc(n)`.

## Reference

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

## Also see

[M-5] [Dmatrix\(\)](#) — Duplication matrix

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

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

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