

**det()** — Determinant of matrix

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## Description

`det(A)` returns the determinant of  $A$ .

`dettriangular(A)` returns the determinant of  $A$ , treating  $A$  as if it were triangular (even if it is not).

## Syntax

*numeric scalar* `det(numeric matrix A)`

*numeric scalar* `dettriangular(numeric matrix A)`

## Remarks and examples

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Calculation of the determinant is made by obtaining the LU decomposition of  $A$  and then calculating the determinant of  $U$ :

$$\begin{aligned}\det(A) &= \det(PLU) \\ &= \det(P) \times \det(L) \times \det(U) \\ &= \pm 1 \times 1 \times \det(U) \\ &= \pm \det(U)\end{aligned}$$

Since  $U$  is (upper) triangular,  $\det(U)$  is simply the product of its diagonal elements. See [M-5] `lud()`.

## Conformability

`det(A)`, `dettriangular(A)`:  
*A*:  $n \times n$   
*result*:  $1 \times 1$

## Diagnostics

`det(A)` and `dettriangular(A)` return 1 if  $A$  is  $0 \times 0$ .

`det(A)` aborts with error if  $A$  is not square and returns missing if  $A$  contains missing values.

`dettriangular(A)` aborts with error if  $A$  is not square and returns missing if any element on the diagonal of  $A$  is missing.

Both `det(A)` and `dettriangular(A)` will return missing value if the determinant exceeds  $8.99e+307$ .

## Also see

[M-5] `lud()` — LU decomposition

[M-4] `matrix` — Matrix functions