det( ) — Determinant of matrix

**Description**

\[ \text{det}(A) \] returns the determinant of \( A \).

\[ \text{dettriangular}(A) \] returns the determinant of \( A \), treating \( A \) as if it were triangular (even if it is not).

**Syntax**

\[ \text{numeric scalar} \quad \text{det}(\text{numeric matrix} \ A) \]

\[ \text{numeric scalar} \quad \text{dettriangular}(\text{numeric matrix} \ A) \]

**Remarks and examples**

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

\[
\text{det}(A) = \text{det}(PLU) = \text{det}(P) \times \text{det}(L) \times \text{det}(U) = \pm 1 \times 1 \times \text{det}(U) = \pm \text{det}(U)
\]

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

**Conformability**

\[ \text{det}(A), \text{dettriangular}(A): \]

\[
\begin{align*}
A: & \quad n \times n \\
result: & \quad 1 \times 1
\end{align*}
\]
Diagnostics

\( \text{det}(A) \) and \( \text{dettriangular}(A) \) return 1 if \( A \) is \( 0 \times 0 \).

\( \text{det}(A) \) aborts with error if \( A \) is not square and returns missing if \( A \) contains missing values.

\( \text{dettriangular}(A) \) aborts with error if \( A \) is not square and returns missing if any element on the diagonal of \( A \) is missing.

Both \( \text{det}(A) \) and \( \text{dettriangular}(A) \) will return missing value if the determinant exceeds 8.99e+307.

Also see

[M-5] \( \text{lud}() \) — LU decomposition

[M-4] \( \text{Matrix} \) — Matrix functions