\textbf{det()} — Determinant of matrix

\begin{tabular}{|c|c|c|c|}
\hline
\textbf{Description} & \textbf{Syntax} & \textbf{Remarks and examples} & \textbf{Conformability} \\
\hline
& & & \\
\hline
\end{tabular}

\textbf{Description}

\texttt{det(A)} returns the determinant of \( A \).

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

\textbf{Syntax}

\begin{itemize}
\item \texttt{numeric scalar \ det(numeric matrix A)}
\item \texttt{numeric scalar \ dettriangular(numeric matrix A)}
\end{itemize}

\textbf{Remarks and examples}

Calculation of the determinant is made by obtaining the \texttt{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 \texttt{[M-5 lud()]}. 

\textbf{Conformability}

\begin{itemize}
\item \( \text{det}(A), \text{dettriangular}(A) \):
\item \( A: \ n \times n \)
\item \( \text{result:} \ 1 \times 1 \)
\end{itemize}
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 \( 8.99\times10^3 \).

Also see

[M-5] **lud()** — LU decomposition

[M-4] **Matrix** — Matrix functions