range() — Vector over specified range

**Description**

\texttt{range(a, b, delta)} returns a column vector going from \(a\) to \(b\) in steps of \(\text{abs}(\text{delta})\) \((b \geq a)\) or \(-\text{abs}(\text{delta})\) \((b < a)\).

\texttt{rangen(a, b, n)} returns a \(\text{round}(n) \times 1\) column vector going from \(a\) to \(b\) in \(\text{round}(n)-1\) steps. \(a\) may be less than, equal to, or greater than \(b\).

**Syntax**

\[
\text{numeric colvector} \quad \text{range}(a, b, \text{numeric scalar } \text{delta})
\]

\[
\text{numeric colvector} \quad \text{rangen}(a, b, \text{real scalar } n)
\]

where \(a\) and \(b\) are numeric scalars.

**Remarks and examples**

\texttt{range(0, 1, .25)} returns \((0 \ \ .25 \ \ .5 \ \ .75 \ \ 1)\). The sign of the third argument does not matter; \texttt{range(0, 1, -.25)} returns the same thing. \texttt{range(1, 0, .25)} and \texttt{range(1, 0, -.25)} return \((1 \ \ .75 \ \ .5 \ \ .25 \ \ 0)\).

\texttt{rangen(0, .5, 6)} returns \((0 \ \ .1 \ \ .2 \ \ .3 \ \ .4 \ \ .5)\). \texttt{rangen(.5, 0, 6)} returns \((.5 \ \ .4 \ \ .3 \ \ .2 \ \ .1 \ \ 0)\).

\texttt{range()} and \texttt{rangen()} may be used with complex arguments. \texttt{range(1, 1i, .4)} returns \((1 \ \ .75+.25i \ \ .5+.5i \ \ .25+.75i \ \ 1i)\). \texttt{rangen(1, 1i, 5)} returns the same thing. For \texttt{range()}, only the distance of \texttt{delta} from zero matters, so \texttt{range(1, 1i, .4i)} would produce the same result, as would \texttt{range(1, 1i, .25+.312i)}.

**Conformability**

\texttt{range(a, b, \text{delta})}:

- \(a\): \(1 \times 1\)
- \(b\): \(1 \times 1\)
- \(\text{delta}\): \(1 \times 1\)
- \(\text{result}\): \(1 \times 1\), if \(a = b\)
  \[
  \text{max}(1+\text{abs}(b-a)/\text{abs}(\text{delta}),2) \times 1, \text{ otherwise}
  \]
\texttt{rangen(a, b, n)}:
\begin{itemize}
  \item \textit{a}: \hspace{0.5cm} 1 \times 1
  \item \textit{b}: \hspace{0.5cm} 1 \times 1
  \item \textit{n}: \hspace{0.5cm} n \times 1
\end{itemize}
result: \hspace{0.5cm} \text{round}(n) \times 1

\textbf{Diagnostics}

\texttt{range(a, b, delta)} aborts with error if \textit{a}, \textit{b}, or \textit{delta} contains missing, if \texttt{abs(b-a)/abs(delta)} results in overflow, or if \texttt{1+abs(b-a)/abs(delta)} results in a vector that is too big given the amount of memory available.

\texttt{range(a, b, delta)} returns a $1 \times 1$ result when \textit{a} = \textit{b}. In all other cases, the result is $2 \times 1$ or longer.

\texttt{rangen(a, b, n)} aborts with error if \texttt{round(n)} is less than 0 or missing.

\textbf{Also see}

[M-4] \textbf{Standard} — Functions to create standard matrices