trunc() — Round to integer

Syntax

```
real matrix trunc(real matrix R)

real matrix floor(real matrix R)

real matrix ceil(real matrix R)

real matrix round(real matrix R)

real matrix round(real matrix R, real matrix U)
```

Description

These functions convert noninteger values to integers by moving toward 0, moving down, moving up, or rounding. These functions are typically used with scalar arguments, and they return a scalar in that case. When used with vectors or matrices, the operation is performed element by element.

- `trunc(R)` returns the integer part of `R`.
- `floor(R)` returns the largest integer `i` such that `i ≤ R`.
- `ceil(R)` returns the smallest integer `i` such that `i ≥ R`.
- `round(R)` returns the integer closest to `R`.
- `round(R, U)` returns the values of `R` rounded in units of `U` and is equivalent to `round((R:/U)):*:U`. For instance, `round(R, 2)` returns `R` rounded to the closest even number. `round(R, .5)` returns `R` rounded to the closest multiple of one half. `round(R, 1)` returns `R` rounded to the closest integer and so is equivalent to `round(R)`.

Remarks and examples

Remarks are presented under the following headings:

- Relationship to Stata’s functions
- Examples of rounding
**Relationship to Stata’s functions**

\texttt{trunc()} is equivalent to Stata’s \texttt{int()} function.

\texttt{floor()}, \texttt{ceil()}, and \texttt{round()} are equivalent to Stata’s functions of the same name.

**Examples of rounding**

<table>
<thead>
<tr>
<th>$x$</th>
<th>\texttt{trunc}(x)</th>
<th>\texttt{floor}(x)</th>
<th>\texttt{ceil}(x)</th>
<th>\texttt{round}(x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1.3</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>1.6</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>−1</td>
<td>−1</td>
<td>−1</td>
<td>−1</td>
<td>−1</td>
</tr>
<tr>
<td>−1.3</td>
<td>−1</td>
<td>−2</td>
<td>−1</td>
<td>−1</td>
</tr>
<tr>
<td>−1.6</td>
<td>−1</td>
<td>−2</td>
<td>−1</td>
<td>−2</td>
</tr>
</tbody>
</table>

**Conformability**

\texttt{trunc}(R), \texttt{floor}(R), \texttt{ceil}(R):

\begin{align*}
  R &: r \times c \\
  \text{result} &: r \times c
\end{align*}

\texttt{round}(R):

\begin{align*}
  R &: r \times c \\
  \text{result} &: r \times c
\end{align*}

\texttt{round}(R, U):

\begin{align*}
  R &: r_1 \times c_1 \\
  U &: r_2 \times c_2, \text{ } R \text{ and } U \text{ r-conformable} \\
  \text{result} &: \text{max}(r_1, r_2) \times \text{max}(c_1, c_2)
\end{align*}

**Diagnostics**

Most Stata and Mata functions return missing when arguments contain missing, and in particular, return . whether the argument is ., .a, .b, . . . , .z. The logic is that performing the operation on a missing value always results in the same missing-value result. For example, \texttt{sqrt(.a)==.}.

These functions, however, when passed a missing value, return the particular missing value. Thus \texttt{trunc(.a)==.a}, \texttt{floor(.b)==.b}, \texttt{ceil(.c)==.c}, and \texttt{round(.d)==.d}.

For \texttt{round()} with two arguments, this applies to the first argument and only when the second argument is not missing. If the second argument is missing (whether ., .a, . . . , or .z), then . is returned.
Also see

[M-4] **scalar** — Scalar mathematical functions