**Toeplitz( )** — Toeplitz matrices



## Description

`Toeplitz(`*c1*`,` *r1*`)` returns the Toeplitz matrix defined by *c1* being its first column and *r1* being its first row. A Toeplitz matrix $T$ is characterized by $T[i,j] = T[i-1,j-1]$, $i,j > 1$. In a Toeplitz matrix, each diagonal is constant.

Vectors *c1* and *r1* specify the first column and first row of $T$.

## Syntax

*numeric matrix* `Toeplitz(`*numeric colvector c1*`,` *numeric rowvector r1*`)`

## Remarks and examples

*c1*`[1]` is used to fill $T$`[1,1]`, and *r1*`[1]` is not used.

To obtain the symmetric (Hermitian) Toeplitz matrix, code `Toeplitz(`$v$`,` $v'$`)` (if $v$ is a column vector), or `Toeplitz(`$v'$`,` $v$`)` if $v$ is a row vector.

## Conformability

`Toeplitz(`*c1*`,` *r1*`)`:

| | |
|---|---|
| *c1*: | $r \times 1$ |
| *r1*: | $1 \times c$ |
| *result*: | $r \times c$ |

## Diagnostics

None.

Otto Toeplitz (1881–1940) was born in Breslau, Germany (now Wrocław, Poland), and educated there in mathematics. He researched and taught at universities in Göttingen, Kiel, and Bonn, making many contributions to algebra and analysis, but he was dismissed in 1935 for being a Jew. Toeplitz emigrated to Palestine in 1939 but died a few months later in Jerusalem. He was fascinated by the history of mathematics and wrote a popular work with Hans Rademacher, *The Enjoyment of Mathematics*.

## Reference

Robinson, A. 1976. “Toeplitz, Otto”. In *Dictionary of Scientific Biography*, edited by C. C. Gillispie, vol. 13. New York: Scribner’s.

## Also see

[M-4] **Standard** — Functions to create standard matrices