rank() — Rank of matrix

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Description

rank(*A*) and rank(*A*, *tol*) return the rank of *A*: $m \times n$.

Syntax

real scalar rank(*numeric matrix A*)

real scalar rank(*numeric matrix A*, *real scalar tol*)

Remarks and examples

The row rank of a matrix *A*: $m \times n$ is the number of rows of *A* that are linearly independent. The column rank is the number of columns that are linearly independent. The terms row rank and column rank, however, are used merely for emphasis. The ranks are equal, and the result is simply called the rank of *A*.

rank() calculates the rank by counting the number of nonzero singular values of the SVD of *A*, where nonzero is interpreted relative to a tolerance. rank() uses the same tolerance as pinv() (see [M-5] **pinv()**) and as svsolve() (see [M-5] **svsolve()**), and optional argument *tol* is specified in the same way as with those functions.

Thus if you were going to use rank() before calculating an inverse using pinv(), it would be better to skip rank() altogether and proceed to the pinv() step, because pinv() will return the rank, calculated as a by-product of calculating the inverse. Using rank() ahead of time, the SVD would be calculated twice.

rank() in general duplicates calculations; and, worse, if you are not planning on using pinv() or svsolve() but rather are planning on using some other function, the rank returned by rank() may disagree with the implied rank of whatever numerical method you subsequently use because each numerical method has its own precision and tolerances.

All that said, rank() is useful in interactive and pedagogical situations.

Conformability

rank(*A*, *tol*):

A:	$m \times n$	
tol:	1×1	(optional)
result:	1×1	

Diagnostics

rank(*A*) returns missing if *A* contains missing values.

Also see

[M-5] **fullsvd( )** — Full singular value decomposition

[M-5] **pinv( )** — Moore–Penrose pseudoinverse

[M-5] **svd( )** — Singular value decomposition

[M-4] **Matrix** — Matrix functions