

## Description

`invorder(p)` returns the permutation vector that undoes the permutation performed by  $p$ .

`revorder(p)` returns the permutation vector that is the reverse of the permutation performed by  $p$ .

## Syntax

*real vector* `invorder(real vector p)`

*real vector* `revorder(real vector p)`

where  $p$  is assumed to be a [permutation vector](#).

## Remarks and examples

See [\[M-1\] Permutation](#) for a description of permutation vectors. To summarize,

1. Permutation vectors  $p$  are used to permute the rows or columns of a matrix  $X: r \times c$ .

If  $p$  is intended to permute the rows of  $X$ , the permuted  $X$  is obtained via  $Y = X[p, \cdot]$ .

If  $p$  is intended to permute the columns of  $X$ , the permuted  $X$  is obtained via  $Y = X[\cdot, p]$ .

2. If  $p$  is intended to permute the rows of  $X$ , it is called a row-permutation vector. Row-permutation vectors are  $r \times 1$  column vectors.
3. If  $p$  is intended to permute the columns of  $X$ , it is called a column-permutation vector. Column-permutation vectors are  $1 \times c$  row vectors.
4. Row-permutation vectors contain a permutation of the integers 1 to  $r$ .
5. Column-permutation vectors contain a permutation of the integers 1 to  $c$ .

Let us assume that  $p$  is a row-permutation vector, so that

$$Y = X[p, \cdot]$$

`invorder(p)` returns the row-permutation vector that undoes  $p$ :

$$X = Y[\text{invorder}(p), \cdot]$$

That is, using the matrix notation of [M-1] **Permutation**,

$$Y = PX \quad \text{implies} \quad X = P^{-1}Y$$

If  $p$  is the permutation vector corresponding to permutation matrix  $P$ , `invorder( $p$ )` is the permutation vector corresponding to permutation matrix  $P^{-1}$ .

`revorder( $p$ )` returns the permutation vector that reverses the order of  $p$ . For instance, say that row-permutation vector  $p$  permutes the rows of  $X$  so that the diagonal elements are in ascending order. Then `revorder( $p$ )` would permute the rows of  $X$  so that the diagonal elements would be in descending order.

## Conformability

`invorder( $p$ )`, `revorder( $p$ )`:

$p$ :	$r \times 1$	or	$1 \times c$
result:	$r \times 1$	or	$1 \times c$

## Diagnostics

`invorder( $p$ )` and `revorder( $p$ )` can abort with error or can produce meaningless results when  $p$  is not a permutation vector.

## Also see

[M-1] **Permutation** — An aside on permutation matrices and vectors

[M-4] **Manipulation** — Matrix manipulation

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