

# Package: matrixmodp (via r-universe)

August 20, 2024

**Title** Working with Matrices over Finite Prime Fields

**Version** 0.2.0

**Description** Provides functions for row-reducing and inverting matrices with entries in many of the finite fields (those with a prime number of elements). With this package, users will be able to find the reduced row echelon form (RREF) of a matrix and calculate the inverse of a (square, invertible) matrix.

**License** GPL (>= 2)

**Encoding** UTF-8

**Roxygen** list(markdown = TRUE)

**RoxygenNote** 7.3.1

**Suggests** testthat (>= 3.0.0)

**Config/testthat/edition** 3

**URL** <https://github.com/rhigginbottom/matrixmodp>,  
<https://rhigginbottom.github.io/matrixmodp/>

**BugReports** <https://github.com/rhigginbottom/matrixmodp/issues>

**Repository** <https://rhigginbottom.r-universe.dev>

**RemoteUrl** <https://github.com/rhigginbottom/matrixmodp>

**RemoteRef** HEAD

**RemoteSha** 4f9146aeb7cb3011bd1ee45e5bb4ff214071561a

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`inv_p`*Calculate the inverse of a matrix mod p*

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**Description**

`inv_p()` finds the inverse of a square matrix over the field  $F_p$ . The function checks for invertibility and then row-reduces the augmented matrix  $[A|I]$  over  $F_p$  to find the inverse.

**Usage**

```
inv_p(A, p)
```

**Arguments**

A	A square matrix
p	A prime integer

**Value**

A square matrix of the same size as A

**Examples**

```
B <- matrix(c(5, 2, 3, 6, 5, 5, 4, 0, 2), 3, 3)
inv_p(B, 7)
C <- matrix(c(3, 0, 4, 0, 2, 1, 1, 3, 0, 3, 0, 1, 3, 0, 2, 1), 4, 4)
inv_p(C, 5)
```

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`rref_p`*Find the RREF of a matrix mod p*

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**Description**

`rref_p()` calculates the unique reduced-row echelon form of a matrix with entries in the finite field  $F_p$ .

**Usage**

```
rref_p(A, p)
```

**Arguments**

A	A matrix
p	A prime integer

*rref\_p*

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**Value**

A matrix of the same size as A which is the unique reduced-row echelon form of A.

**Examples**

```
B <- matrix(c(3, 4, 1, 3, 2, 0), 2, 3)
rref_p(B, 5)
C <- matrix(c(0, 2, 0, 0, 0, 2, 0, 1, 1), 3, 3)
rref_p(C, 3)
```

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