

EchelonForm

To enter a matrix, use the format below. The QQ means your matrix will have rational numbers for entries, and the matrix is entered as a list of rows [row1, row2, ...]. Each row has the form row=[entry, entry, ...,entry]. To evaluate, either hit the evaluate button, or shift-return on the keyboard

```
A=matrix(QQ,[[1,0,0,-2],[0,2,2,0],[0,0,1,3],[-2,3,2,1]])
```

To list the entry type A. Note that you can make things look pretty by clicking the "Typeset" box at the top of the worksheet.

```
A
```

$$\begin{pmatrix} 1 & 0 & 0 & -2 \\ 0 & 2 & 2 & 0 \\ 0 & 0 & 1 & 3 \\ -2 & 3 & 2 & 1 \end{pmatrix}$$

You can do this all on one line as

```
A=matrix(QQ,[[1,0,0,-2],[0,2,2,0],[0,0,1,3],[-2,3,2,1]]); A
```

$$\begin{pmatrix} 1 & 0 & 0 & -2 \\ 0 & 2 & 2 & 0 \\ 0 & 0 & 1 & 3 \\ -2 & 3 & 2 & 1 \end{pmatrix}$$

To extract the reduced row echelon form of A, type either A.echelon_form() or A.rref()

```
A.rref(); A.echelon_form()
```

$$\begin{pmatrix} 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & -3 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & -3 \\ 0 & 0 & 1 & 3 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$