

Sage and Linear Algebra Worksheet

FCLA Section RREF

Robert Beezer

Department of Mathematics and Computer Science

University of Puget Sound

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To specify a matrix, first specify that your entries are rational numbers, QQ in Sage parlance. This is extremely important, though an explanation is best saved for later. Then the number of rows and columns. Follow this with a list of rows for the matrix, where each row is another list. We use square brackets, [,] to organize lists. To actually see A we just write it as the last line.

```
A = matrix(QQ, 3, 4, [[-1, 1, 1, 1],
                      [ 2, -1, -2, -3],
                      [-2, 2, 1, -1]])
A
```

Then use the `.rref()` method to compute the reduced row-echelon form.

Exercise 1. Use a new cell, enter `A.rref()`, and execute the cell.

Here is a larger example.

```
B = matrix(QQ, [[ 0, 0, -1, 3, 3, -1, 2, -1],
                [ 1, -5, 0, -4, 5, -2, 4, 4],
                [-1, 5, -1, 7, -2, 2, -5, -7],
                [-1, 5, 1, 1, -8, 3, -6, -3]])
B
```

Exercise 2. As above, use a new cell to compute the reduced row-echelon form of B.

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