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.

Demonstration 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
```

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