

In this post, I'll continue writing R code to accompany linear algebra equations found in Linear Algebra: Step by Step, by Kuldeep Singh. For more information on the origins of these posts, see [the first companion post](#)

Section 2.3 – Linear Independence

To detect linear dependence in rows or columns, the simplest way I've found is by using the qr function to check rank. Unfortunately, rank is covered in section 3.5.5.

Example 2.13 can be completed with the code below, since we compare the output to what we know of the matrix. The rank is 3, and it's a 3×3 matrix, so we have linear independence. First, establish A as the matrix, then transpose it in the qr function so we're checking columns for linear dependence. The book later proves that row and column ranks are equal, but for the sake of this exercise, we'll be sure to check columns.

```
A <- matrix(c(-3,0,2,1,1,0,0,-1,0), nrow = 3, byrow = TRUE)
qr(t(A), tol = NULL)
```

Example 2.14 is performed with the code below, interpreting similarly.

```
A <- matrix(c(2,-4,0,3,19,0,7,-5,0), nrow = 3, byrow = TRUE)
qr(t(A), tol = NULL)
```