**NOTE 9/12**

To obtain a good understanding of our discussion during the first half of class today, I recommend the following exercise (in addition to reading and doing exercises from the textbook (or any other resources) as usual).

Determine what can be said about existence and uniqueness of solutions to linear systems in the following scenarios.

(1) A $3 \times 5$ coefficient matrix for a system has three pivot columns.
(2) The fifth column of a $3 \times 5$ augmented matrix for a system is a pivot column.
(3) The coefficient matrix for a system has a pivot position in every row.
(4) The coefficient matrix of a system of three equations in three variables has a pivot in each column.
(5) A system of linear equations has more variables than equations and is known to be consistent (solutions exist). Can you have an inconsistent system with more variables than equations?
(6) A system of linear equations has more equations than variables. Can you have a consistent system with more equations than variables?

Notice that while you may be able to intuitively determine the answers to existence/uniqueness questions without the help of the correpondence between matrices and linear systems, this correspondence allows us to make our ideas about these questions *precise*.