

Turn these problems in with the assigned problems from the text:

- (1) After getting a matrix in row echelon form, why is the number of nonzero rows always less than or equal to the number of columns?

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- (2) Write down all possible shapes for a 3×4 matrix in *reduced* row echelon form.

For example, here is one shape

$$\begin{bmatrix} 1 & * & 0 & * \\ 0 & 0 & 1 & * \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

where the symbol $*$ denotes an arbitrary entry of the matrix.

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- (3) When doing elimination, why are you permitted to do the three elementary row operations? Explain for each operation. Why don't we do "column operations"?

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- (4) Let A be an $m \times n$ matrix. Let I_n denote the $n \times n$ identity matrix. Prove that

$$I_m A = A = A I_n.$$

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- (5) Let $A = \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$. Compute A^2 , A^3 , and A^4 . Try to find a pattern in the entries of these matrices (compute some more powers if you need to). Do you recognize these numbers? Make a conjecture about the entries of A^n .