## **Exercises on solving** $A\mathbf{x} = \mathbf{b}$ and row reduced form R

**Problem 8.1:** (3.4 #13.(a,b,d) *Introduction to Linear Algebra:* Strang) Explain why these are all false:

- a) The complete solution is any linear combination of  $\mathbf{x}_p$  and  $\mathbf{x}_n$ .
- b) The system  $A\mathbf{x} = \mathbf{b}$  has at most one particular solution.
- c) If *A* is invertible there is no solution  $\mathbf{x}_n$  in the nullspace.

**Problem 8.2:** (3.4 #28.) Let

$$U = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 0 & 4 \end{bmatrix} \text{ and } \mathbf{c} = \begin{bmatrix} 5 \\ 8 \end{bmatrix}.$$

Use Gauss-Jordan elimination to reduce the matrices  $\begin{bmatrix} U & 0 \end{bmatrix}$  and  $\begin{bmatrix} U & \mathbf{c} \end{bmatrix}$  to  $\begin{bmatrix} R & 0 \end{bmatrix}$  and  $\begin{bmatrix} R & \mathbf{d} \end{bmatrix}$ . Solve  $R\mathbf{x} = \mathbf{0}$  and  $R\mathbf{x} = \mathbf{d}$ .

Check your work by plugging your values into the equations  $U\mathbf{x} = \mathbf{0}$  and  $U\mathbf{x} = \mathbf{c}$ .

**Problem 8.3:** (3.4 #36.) Suppose  $A\mathbf{x} = \mathbf{b}$  and  $C\mathbf{x} = \mathbf{b}$  have the same (complete) solutions for every **b**. Is it true that A = C?

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