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Exercise 1. Determine whether these augmented matrices are in REF, RREF or not.

$$\left[\begin{array}{cccc|c} 1 & 4 & 0 & -5 & -3 \\ 0 & 0 & 1 & -1 & 7 \end{array}\right], \quad \left[\begin{array}{cc|c} 1 & 0 & -3 \\ 0 & 0 & 0 \\ 0 & 1 & 4 \end{array}\right], \quad \left[\begin{array}{ccc|c} 9 & -2 & 3 & 1 \\ 0 & 3 & 4 & -9 \\ 0 & 0 & 0 & 8 \end{array}\right], \quad \left[\begin{array}{ccccc|c} 1 & 1 & 0 & 0 & -4 & 3 \\ 0 & 0 & 1 & 0 & 1 & 7 \\ 0 & 0 & 0 & 1 & 2 & 2 \end{array}\right].$$

Exercise 2. Solve the system

$$\begin{cases} -3x_1 & & + & 6x_3 & = & 2 \\ & x_2 & + & 3x_3 & = & 1\,. \\ 3x_1 & + 2x_2 & - & 2x_3 & = & 4 \end{cases}$$

Exercise 3. Solve the system

$$\begin{cases} x_1 - 2x_2 + 2x_3 + x_4 - 2x_5 = 2 \\ 2x_1 - 4x_2 + 3x_3 + 3x_4 - 2x_5 = 4 \\ x_1 - 2x_2 + x_3 + 2x_4 = 2 \\ - x_3 + x_4 - 2x_5 = -4 \end{cases}.$$

Exercise 4. Use elementary row operations to determine the value(s) of a and b such that the system

$$\begin{cases} x_1 - x_2 + x_3 = 1 \\ ax_1 + (a-1)x_2 - 2ax_3 = b \\ -2x_1 + 3x_2 - (a+2)x_3 = -a \end{cases}$$

(a) has unique solution;

(b) has infinitely many solutions;

(c) has no solution.