1. The following augmented matrices represent linear systems in three variables. In each case determine the number of solutions. You do NOT need to solve the system of equations.

$$A = \left(\begin{array}{ccc|c} 3 & 0 & 2 & 3 \\ 0 & -2 & 0 & 4 \\ 0 & 0 & 1 & 5 \end{array}\right), \quad B = \left(\begin{array}{ccc|c} 1 & 1 & 1 & 2 \\ 0 & 2 & 2 & 4 \\ 0 & 3 & 3 & 5 \end{array}\right), \quad C = \left(\begin{array}{ccc|c} 1 & 0 & 2 & 3 \\ 0 & 4 & 0 & 2 \\ 0 & 2 & 0 & 1 \end{array}\right).$$

2. The sum of the digits of a two-digit number is 9. When the digits are reversed, the number is decreased by 45. Find the number.

3. For the following linear system, (a) write it in augmented matrix form; (b) use Gaussian elimination to put the matrix into echelon form (EF); (c) check whether the system is consistent or inconsistent; (d) if the system is consistent, proceed by Gauss-Jordan elimination to put the matrix into reduced row echelon form (RREF) and write down the general solution.

$$\begin{aligned} x_1 - x_2 + x_3 &= 6 \\ x_2 &= 1 \\ x_1 + x_3 &= 2 \end{aligned}$$

4. Repeat the same steps (a)-(d) as in the previous question, this time for the linear system

$$\begin{aligned} -3x_1 + x_2 + 2x_3 &= 6 \\ 4x_1 + 2x_2 - x_3 &= 2 \\ -2x_1 + 4x_2 + 3x_3 &= 14. \end{aligned}$$