**Note:** Show all your operations in detail. The solutions that do not have enough details will be graded with zero points.

1. (P.396 Q.8) Consider the four $3 \times 3$ linear systems having the same coefficient matrix:

$$\begin{aligned} 2x_1 - 3x_2 + x_3 &= 2 \\ x_1 + x_2 - x_3 &= -1 \\ -x_1 + x_2 - 3x_3 &= 0 \end{aligned} \qquad \begin{aligned} 2x_1 - 3x_2 + x_3 &= 6 \\ x_1 + x_2 - x_3 &= 4 \\ -x_1 + x_2 - 3x_3 &= 5 \end{aligned}$$

$$\begin{aligned} 2x_1 - 3x_2 + x_3 &= 0 \\ x_1 + x_2 - x_3 &= 1 \\ -x_1 + x_2 - 3x_3 &= -3 \end{aligned} \qquad \begin{aligned} 2x_1 - 3x_2 + x_3 &= -1 \\ x_1 + x_2 - x_3 &= 0 \\ -x_1 + x_2 - 3x_3 &= 0 \end{aligned}$$

   (a) Solve the linear systems by applying Gaussian elimination to the augmented matrix

$$\left[ \begin{array}{ccc:cccc} 2 & -3 & 1 & 2 & 6 & 0 & -1 \\ 1 & 1 & -1 & -1 & 4 & 1 & 0 \\ -1 & 1 & -3 & 0 & 5 & -3 & 0 \end{array} \right].$$

   (b) Solve the linear systems by finding and multiplying by the inverse of

$$A = \left[ \begin{array}{ccc} 2 & -3 & 1 \\ 1 & 1 & -1 \\ -1 & 1 & -3 \end{array} \right].$$

   (c) Which method requires more operations?