

Use Gaussian elimination with back substitution to solve the following system:

$$\begin{aligned}4x_2 - 3x_3 &= 3, \\ -x_1 + 7x_2 - 5x_3 &= 4, \\ -x_1 + 8x_2 - 6x_3 &= 5.\end{aligned}$$

Consider the following three systems where the coefficients are the same for each system, but the right-hand sides are different (this situation occurs frequently):

$$\begin{aligned}4x - 8y + 5z &= 1 & \Big| & 0 & 0, \\ 4x - 7y + 4z &= 0 & \Big| & 1 & 0, \\ 3x - 4y + 2z &= 0 & \Big| & 0 & 1.\end{aligned}$$

Solve all three systems at one time by performing Gaussian elimination on an augmented matrix of the form

$$[A \mid \mathbf{b}_1 \mid \mathbf{b}_2 \mid \mathbf{b}_3].$$
