Directions: You may work to solve these problems in groups, but all written work must be your own. Show all work; no credit for solutions without work..

1. Solve the following systems of linear equations. Verify that your solution is correct by substituting values back into their original equations.

   (a)

   $$\begin{aligned} x_1 - x_2 &= 10 \\ 3x_1 + 2x_2 &= -5 \end{aligned}$$

   (b)

   $$\begin{aligned} x_1 + x_2 - 2x_3 &= 0 \\ 3x_2 + 2x_3 &= 1 \\ 2x_1 - x_3 &= 8 \end{aligned}$$

2. [1.1.{19,20}] Determine if the system is consistent. Do not fully solve.

   (a)

   $$\begin{aligned} x_1 + 3x_3 &= 2 \\ x_2 - 3x_4 &= 3 \\ -2x_2 + 3x_3 + 2x_4 &= 1 \\ 3x_1 + 7x_4 &= -5 \end{aligned}$$

   (b)

   $$\begin{aligned} x_1 - 2x_4 &= -3 \\ 2x_2 + 2x_3 &= 0 \\ x_3 + 3x_4 &= 1 \\ -2x_1 + 3x_2 + 2x_3 + x_4 &= 5 \end{aligned}$$

3. An augmented matrix with unknown entries.

   (a) Find an equation involving a, b, and c that makes the following augmented matrix correspond to a consistent system.

   $$\begin{bmatrix} 1 & 2 & 4 \\ 2 & 1 & 5 \\ a & b & c \end{bmatrix}$$

   (b) Let $\mathcal{L}$ be the set of lines $ax_1 + bx_2 = c$ such that a, b, and c make the augmented matrix in part (a) consistent. Give a geometric description of $\mathcal{L}$.