1. Consider the system of linear equations $S = \begin{cases} 4x + 3y + 12z = -7 \\ 2x + 3y + 6z = -1 \\ 3x - 9z = 6 \end{cases}$

   (a) Write the augmented matrix of the system S_1 and perform row operation, **by hand**, to transform it into reduced row echelon form.

   (b) Use the reduced row echelon form of matrix to solve the system of equations.

   (c) Demonstrate that your solution is correct by showing it is a solution to S_1 by direct calculation.

2. For each system of linear equations below, the reduced row echelon form of the augmented matrix is provided for you. Use it to find the solution set to the system.

   (a) $S_2 = \begin{cases} w - x - 3y = 1 \\ x + 2y = 3 \\ 2w - x - 4y + 2z = 7 \\ w - y + z = 5 \end{cases}$, $\begin{bmatrix} 1 & 0 & -1 & 0 & 4 \\ 0 & 1 & 2 & 0 & 3 \\ 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

   (b) $s_3 = \begin{cases} w - x - 3y = 1 \\ x + 2y + z = 4 \\ -w + 2x + 5y + 2z = 7 \\ -w + x + 3y - z = 1 \end{cases}$, $\begin{bmatrix} 1 & 0 & -1 & 0 & 0 \\ 0 & 1 & 2 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$