

Show all work.

1. **(8 points)** For each of the following matrices, either state that the given matrix is in reduced form or explain why it is not and indicate which row operation would transform it into reduced form.

(a)
$$\left[\begin{array}{ccc|c} 1 & 0 & 2 & 3 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & -1 & 4 \end{array} \right].$$

(b)
$$\left[\begin{array}{cccc|c} 1 & 0 & -2 & 0 & 1 \\ 0 & 0 & 1 & 1 & 0 \end{array} \right].$$

2. **(10 points)** Use row operations to change the matrix $\left[\begin{array}{ccc|c} 2 & 4 & -10 & -2 \\ 3 & 9 & -21 & 0 \\ 1 & 5 & -12 & 1 \end{array} \right]$ into reduced form.

3. **(2 points)** Use your work on the previous question to solve the system of equations

$$\begin{cases} 2x_1 + 4x_2 - 10x_3 = -2 \\ 3x_1 + 9x_2 - 21x_3 = 0 \\ x_1 + 5x_2 - 12x_3 = 1 \end{cases}$$