

1. By hand, find a matrix in RREF which is row equivalent to the following matrix. Show and label all your steps as we've done in class, for example, if you add 4 copies of row 5 to row 8, write " $r_8 \leftarrow r_8 + 4r_5$ "; if you swap rows 4 and 5, write "swap r_4 and r_5 ", etc. (you don't need the quotes) Use steps that make the work easy.

$$\begin{bmatrix} 40 & 1 & 2 & 2000 & 6042 \\ 0 & 0 & 0 & 10 & 30 \\ 1 & 0 & 0 & 50 & 151 \end{bmatrix}$$

2. Suppose an augmented matrix is in RREF and one of its rows is $0 \ 0 \ 0 \ 0 \ 1$.

2A: Can there be any rows below this one in that augmented matrix? Explain.

2B: Does the underlying system of equations have no solutions, one, or infinitely many? Fully explain your answer.

3. Suppose the augmented matrix corresponding to some system of equations is row equivalent to

$$\begin{bmatrix} 1 & 0 & -2 & 0 & 3 \\ 0 & 1 & 5 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 \end{bmatrix}$$

3A: What are the solutions? (Express them in terms of any free variables)

3B: What are the pivot columns of this matrix? Use notation like c_1 , c_2 , c_3 etc.