

1. Let M be the augmented matrix $\left[\begin{array}{cccc|c} 4 & 5 & -2 & 10 & 20 \\ 3 & 7 & 5 & 10 & 7 \\ 0 & 2 & 4 & 3 & -2 \\ 1 & 2 & 1 & 3 & 3 \end{array} \right]$.

1A: Let S be the system of equations having augmented matrix M . What is the second equation of that system?

1B: You might *begin* to put the matrix M in RREF by first performing the elementary row operation " $r_1 \leftrightarrow r_4$ " on M to produce a row equivalent matrix N , and then doing the elementary row operation " $r_2 \leftarrow r_2 - 3r_1$ " on N to get another row-equivalent matrix P . Explicitly, what is P ?

1C: By calculator, what is $\text{RREF}(M)$?

1D: What are the pivot columns of M ?

1E: Find all the solutions of the system S and write your answer in the agreed-upon form. If there are no solutions, explain why not.

1F: If the system S is not inconsistent, and there are any free variables, what solution results by setting all the free variables to 1? (Write your answer in " n -tuple" form).

1G: If there is an answer to 1F, verify that the solution is indeed a solution by seeing that it satisfies the equation in the answer to 1A.