**1.** Suppose an economy has just three sectors $C$, $N$, $S$. Suppose that $C$ consumes 20% of its own output while the rest of $C$'s output is divided equally for consumption by sectors $N$ and $S$. Suppose $N$ consumes 70% of its own product, $S$ consumes 20% of $N$'s output and the remainder of $N$'s output is used by $C$. Finally, of what is produced by $S$, 90% is taken by $N$ and the rest is used by $C$ (so $S$ takes none of its own output).

1A: In the space below, give both the exchange table for this economy *and* the corresponding system of equations that you need to solve in determining the equilibrium prices $P_C$, $P_N$ and $P_S$ for this economy.

1B: Find the set of equilibrium prices $P_C$, $P_N$ and $P_S$, if given that $P_S = 100$ million dollars. Show any RREF'd matrices involved in your solution.

1C: Find the set of equilibrium prices $P_C$, $P_N$ and $P_S$, if given that the price $N$ pays $C$ for what $N$ consumes of $C$'s output is 80 million dollars.

**2.** Let $A = \begin{bmatrix} 4 & 5 & 1 & 3 \\ 4 & 8 & 4 & 4 \\ 4 & -1 & -5 & 3 \\ 1 & -2 & -3 & 1 \end{bmatrix}$ and $\mathbf{s} = \begin{bmatrix} 11 \\ 12 \\ 5 \\ -1 \end{bmatrix}$. It's a fact that $\mathrm{RREF}(A|\mathbf{s})$ is $\left[\begin{array}{cccc|c} 1 & 0 & -1 & 0 & 3 \\ 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & -2 \\ 0 & 0 & 0 & 0 & 0 \end{array}\right]$.

2A. Find in parametric vector form all solutions to $A\mathbf{x} = \mathbf{s}$.

2B. Find a non-trivial solution $\mathbf{x}$ to $A\mathbf{x} = \mathbf{0}$ or explain why there are none.