Here's an alternative solution to test 1 problem 1(a).

Here we find the inverse of $A = \begin{pmatrix} 2 & 2 & -2 \\ -1 & 0 & 2 \\ 1 & 2 & 1 \end{pmatrix}$ using row reduction. Remember, there is no unique way to do this, but it is an example of what such a solution may look like. We will attempt to do it in as few steps as possible. If you can do this by hand in less steps, congratulations.

We augment A with I_3 and reduce to find A^{-1}.

$$\left(\begin{array}{ccc|ccc} 2 & 2 & -2 & 1 & 0 & 0 \\ -1 & 0 & 2 & 0 & 1 & 0 \\ 1 & 2 & 1 & 0 & 0 & 1 \end{array}\right)$$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & -2 & 0 & -1 & 0 \\ 0 & 2 & 3 & 0 & 1 & 1 \\ 0 & 2 & 2 & 1 & 2 & 0 \end{array}\right) \begin{array}{c} -R2 \\ R2+R3 \\ R1+2R2 \end{array}$$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & -2 & 0 & -1 & 0 \\ 0 & 2 & 2 & 1 & 2 & 0 \\ 0 & 0 & 1 & -1 & -1 & 1 \end{array}\right) \begin{array}{c} R1 \\ R3 \\ R2-R3 \end{array}$$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & 0 & -2 & -3 & 2 \\ 0 & 2 & 0 & 3 & 4 & -2 \\ 0 & 0 & 1 & -1 & -1 & 1 \end{array}\right) \begin{array}{c} R1+2R3 \\ R2-2R3 \\ R3 \end{array}$$

$$\left(\begin{array}{ccc|ccc} 1 & 0 & 0 & -2 & -3 & 2 \\ 0 & 1 & 0 & 3/2 & 2 & -1 \\ 0 & 0 & 1 & -1 & -1 & 1 \end{array}\right) \begin{array}{c} R1+2R3 \\ R2-2R3 \\ R3 \end{array}$$

$$\Rightarrow A^{-1} = \begin{pmatrix} -2 & -3 & 2 \\ 3/2 & 2 & -1 \\ -1 & -1 & 1 \end{pmatrix}$$