Turn these problems in with the assigned problems from the text:

(1) Consider the following set of matrices:

$$\mathcal{C} = \left\{ \begin{bmatrix} a & b \\ -b & a \end{bmatrix} \mid a, b \in \mathbb{R} \right\}.$$

Suppose that $A \in \mathcal{C}$ and $B \in \mathcal{C}$. Show that $A + B \in \mathcal{C}$ and $AB \in \mathcal{C}$. This particular set of matrices forms an algebraic structure that you have seen before. Do you recognize it? *Hint: The matrix* $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ *is in* \mathcal{C} . What happens when you

square this matrix?

(Optional) Bonus Problems: For each problem that you solve correctly I will increase your homework score by one point. All or nothing for these – no partial credit.

(1) Let A be the matrix

$$A = \begin{bmatrix} 1 & 1 & 0 & 0 \\ 1 & 2 & 1 & 0 \\ 0 & 1 & 2 & 1 \\ 0 & 0 & 1 & 2 \end{bmatrix}.$$

Find a lower triangular matrix L and an upper triangular matrix U so that

$$A = LU.$$

Hint: Use elementary matrices.