> Answer the questions below. You may answer in the space provided. You may use the back or a separate sheet of paper if you need more space. You are to work in groups of no more than four people. Make sure to enter the names of your groupmates below.

Name: _____

Section: _____

Group Members: _____

1. Let A be a 3×3 matrix with eigenvalues 1 and -2 such that

$$E_1 = \text{span}\left\{ \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix} \right\}, \text{ and } E_{-2} = \text{span}\left\{ \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix} \right\}.$$

   (a) (2 points) Explain why A is diagonalizable.

   (b) (3 points) Explain why A is not orthogonally diagonalizable.

   (c) (2 points) Find A (you may use a calculator).

2. (3 points) Show that
$$W = \{ax + b | a \geq b\}$$

   is *not* a subspace of $\mathcal{P}^2$, where $\mathcal{P}^2$ is the real vector space of polynomials of degree at most two with real coefficients.