> Answer the questions below. You may answer in the space provided. You may use 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. (7 points) Let W be the subspace of $\mathbb{R}^3$ spanned by the vector

$$\mathbf{w} = \begin{bmatrix} 2 \\ -3 \\ 1 \end{bmatrix}.$$

     Find a basis for $W^\perp$.

2. (6 points) Diagonalize the matrix

$$A = \begin{bmatrix} 2 & 0 & 3 \\ 0 & 1 & 0 \\ 0 & 1 & 2 \end{bmatrix}$$

     or show that A is not diagonalizable.

3. (7 points) Let W be the subspace of $\mathbb{R}^3$ with the basis

$$\left\{ \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} \frac{1}{\sqrt{5}} \\ 0 \\ \frac{2}{\sqrt{5}} \end{bmatrix} \right\}.$$

Write

$$\mathbf{v} = \begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix}$$

as $\mathbf{v} = \mathbf{w} + \mathbf{w}^\perp$ where $\mathbf{w} \in W$ and $\mathbf{w}^\perp \in W^\perp$.