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. (a) (3 points) Show that $P_i : \mathbb{R}^n \mapsto \mathbb{R}^n$ defined by $P_i(\mathbf{u}) = \text{proj}_{\mathbf{e}_i}(\mathbf{u})$ is a linear transformation, using one of the two definitions. $P_i(\mathbf{u})$ is the projection of $\mathbf{u}$ onto the i-th coordinate.

   (b) (2 points) Find the standard matrix for P_2 for $P_2 : \mathbb{R}^3 \mapsto \mathbb{R}^3$.

   (c) (2 points) Use your answer from part (b) to determine if P_2 is invertible. Explain your reasoning.

2. (3 points) Find a basis for the eigenspace for $\lambda = 3$ of the matrix

$$B = \begin{bmatrix} 4 & -2 \\ 5 & -7 \end{bmatrix}.$$