

1. Let $A = \begin{bmatrix} 8 & -10 \\ 2 & -1 \end{bmatrix}$. Find the required matrices P and D that show why A is diagonalizable.

Hint: The vector $\mathbf{v} = \begin{bmatrix} 5 \\ 2 \end{bmatrix}$ satisfies $A\mathbf{v} = 4\mathbf{v}$.

2. Let $\mathbf{a} = \begin{bmatrix} 5 \\ -2 \\ 7 \end{bmatrix}$ and $\mathbf{b} = \begin{bmatrix} 3 \\ -2 \\ 6 \end{bmatrix}$ and $\mathbf{c} = \begin{bmatrix} 11 \\ w \\ 5 \end{bmatrix}$.

2A. Suppose that H is a subspace of \mathbb{R}^3 and \mathbf{a} is in H . Does \mathbf{b} belong to H^\perp ? Explain your answer.

2B. Find w for which \mathbf{c} and \mathbf{a} are orthogonal.

2C. Find the distance from \mathbf{b} to \mathbf{a} .