1) [5.2 Q18] Find h for the matrix A below such that the eigenspace corresponding to $\lambda = 5$ is 2-dimensional.

$$A = \begin{bmatrix} 5 & -2 & 6 & -1 \\ 0 & 3 & h & 0 \\ 0 & 0 & 5 & 4 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

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2) [5.3 Q37] Construct a 3×3 matrix that is invertible but not diagonalizable.

3) [5.3 Q16] Diagonalize the following matrix B, where the eigenvalues of B are $\lambda = 1, 2$.

$$B = \begin{bmatrix} 0 & -4 & -6 \\ -1 & 0 & -3 \\ 1 & 2 & 5 \end{bmatrix}$$

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4) [5.4 Q11] Define $T\colon\ \mathbb{R}^2 \to \mathbb{R}^2$ by $T(x) = Cx$. Find a basis $\mathcal{B}$ for $\mathbb{R}^2$ with the property that $[T]_{\mathcal{B}}$ is diagonal, where:

$$C = \begin{bmatrix} 4 & -2 \\ -1 & 3 \end{bmatrix}$$