Linear Algebra 5

1. Calculate the eigenvalues in $\mathbb{R}$ for each of the following matrices.

   (a) $\begin{pmatrix} 3 & 0 \\ 8 & -1 \end{pmatrix}$

   (b) $\begin{pmatrix} 10 & -9 \\ 4 & -2 \end{pmatrix}$

   (c) $\begin{pmatrix} -1 & 4 & -2 \\ -3 & 4 & 0 \\ -3 & 1 & 3 \end{pmatrix}$

   (d) $\begin{pmatrix} 2 & 0 & -2 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{pmatrix}$

   (e) $\begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 2 & 0 & 1 \end{pmatrix}$

2. Find bases for each of the eigenspaces of the matrices given above.

3. For each of the matrices A above which satisfy the conditions of the diagonalisation theorem, find matrices P (and P^{-1}) such that $P^{-1}AP$ is diagonal.

4. For each of the matrices in question 3, calculate A^{10}.