

This problem was worth **15 points**.

10 points were awarded for “finding an Eigenbasis.” Points were earned for showing that you knew the procedure for producing such a basis and executing it for all $k > 0$. Those of you who chose a specific value for k and found an Eigenbasis in that specific case earned a fair amount of partial credit towards these 10 points.

5 points were awarded for finding which values of k the matrix is diagonalizable. The important subtlety here is the case where $k = 0$ (where the matrix is not diagonalizable but has real eigenvalues). If you ignored this case and did not address the issue of the diagonalizability when $k = 0$, then you did not receive full credit. This case was the crux for determining which values the matrix was diagonalizable. We awarded partial credit for a correct answer (without adequate explanation or supporting calculation) and theoretical understanding (of geometric/algebraic multiplicities) without implementation (i.e. finding these numbers when $k = 0$).