

Math 132 - HW 8

1. Let V be a finite-dimensional vector space and $S, T \in \mathcal{L}(V)$ be two linear operators. Suppose that there exists a basis $\{v_1, \dots, v_n\}$ of V such that for all $i = 1, \dots, n$, the basis vector v_i is an eigenvector for S and T . Prove that $ST = TS$, in other words S and T commute.
2. Give a linear operator T on \mathbb{C}^3 with eigenvalues 2 and 3 such that for any basis β of \mathbb{C}^3 , $\mathcal{M}(T, \beta)$ is NOT a diagonal matrix.