

Math 469 HW #8
Due 11:00 PM Sunday, Apr. 12

Assume all vector spaces are finite-dimensional.

1. (Axler Problem 7.D.14) Suppose $T \in \mathcal{L}(V)$. Prove that $\dim \text{range } T$ equals the number of nonzero singular values of T .
2. (Axler Problem 7.D.16) Suppose $T_1, T_2 \in \mathcal{L}(V)$. Prove that T_1 and T_2 have the same singular values if and only if there exist isometries $S_1, S_2 \in \mathcal{L}(V)$ so that $T_1 = S_1 T_2 S_2$.
3. (Axler Problem 8.A.9) Suppose $S, T \in \mathcal{L}(V)$ and ST is nilpotent. Prove that TS is also nilpotent.