Chapter 5: Review

42. Two $n \times n$ matrices A and B are called simultaneously diagonalizable if there exists an invertible matrix P such that both $P^{-1}AP$ and $P^{-1}BP$ are diagonal matrices. Prove that if A and B are simultaneously diagonalizable, then $AB = BA$.

44. Let T be a linear operator on R^n. A subspace W of R^n is called T-invariant if $T(\boldsymbol{w})$ is in W for each $\boldsymbol{w}$ in W. Prove that if V is an eigenspace of T, then V is T-invariant.