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Math 110

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Let T be a linear transformation on a vector space V over F . Suppose that $v_1, v_2, \dots, v_k \in V$ are eigenvectors of T that correspond to distinct eigenvalues. Assume that W is a T -invariant subspace of V that contains the vector $v_1 + v_2 + \dots + v_k$. Show that W contains each of $v_1, v_2, \dots, v_k$. [It may help to argue by induction on k .]