Math 132 - HW 8
due February 2

January 26, 2015

1. Let T be a linear operator on an n-dimensional vector space V such that T has n distinct eigenvalues. Prove that V is a T-cyclic subspace of itself. (Hint: use problem 1 on the previous homework.)

2. True/False: Determine which of the following statements are true. For each true statement, give a proof and for each false statement produce a counterexample.

   (a) Let T be a linear operator on an n-dimensional vector space. Then there exists a polynomial $g(t)$ of degree n such that $g(T) = 0$.

   (b) If T is a linear operator on a finite dimensional vector space V and $W \subset V$ is a T-invariant subspace, then the invariant polynomial $\chi(T)$ of T divides the characteristic polynomial $\chi(T|_W)$ of the restriction of T to W.

   (c) Any polynomial of degree n with leading term $(-1)^n$ is the characteristic polynomial of some linear operator.