Math 411 Spring 2016 Homework #8

Due March 29, Tue in class

1. Textbook, 3.D, page 88: 1, 9, 10;
2. Recall that $C[a, b]$ denotes the vector space of real-valued continuous functions on the real interval $[a, b]$. Let $T : C[a, b] \to C[a, b]$ be defined by $T(f(t)) = e^t \cdot f(t)$. Show that T is linear and bijective, and thus an isomorphism. (You may assume that e^t is continuous on $\mathbb{R}$.)
3. Let $T : V \to W$ be a linear map, where V and W are finite-dimensional vector spaces with $\dim(V)$ being odd. Prove that the null space of T and the range of T are not isomorphic.
4. Let the map $T : \mathbb{P}_2(\mathbb{R}) \to \mathbb{P}_2(\mathbb{R})$ be $T(p) = p' - 2p$, where the prime represents the derivative. Show that T is a linear map, and find the matrix representation of T with respect to the standard basis $\{1, t, t^2\}$. Also determine the null space, range, nullity, and rank of T.

More practice problems: *Do not submit*

1. Textbook, 3.C, page 78: 6;

1. Textbook, 3.D, page 88: 3, 11, 12;