Math 24
Spring 2012
Special Assignment due Monday, May 21

This will be the last special homework assignment.

Let V be any vector space over F and W be a subspace of V. We know that V/W is a vector space, and that $T(x) = x + W$ is a linear transformation from V to V/W.

Assignment: Let V be a finite-dimensional vector space over F, and $U : V \to Z$ be a linear transformation with null space W. Show that there is a one-to-one linear transformation $\overline{U} : V/W \to Z$ such that $U = \overline{U}T$.

Note: Intuitively, this result is saying that we can think of U as a two-step transformation; first, collapse W via T; then, transform what is left via $\overline{U}$. The assignment, of course, asks for a proof, not an intuitive argument.