

Math 24  
Spring 2012  
Special Assignment due Monday, May 14

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  $\alpha$  be a basis for  $W$  that can be extended to a basis  $\alpha \cup \beta$  for  $V$  (where  $\alpha \cap \beta = \emptyset$ ). Show that  $\{x + W \mid x \in \beta\}$  is a basis for  $V/W$ .

Note that we have not assumed  $V$  is finite-dimensional, so  $\alpha$  and  $\beta$  may be infinite.