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Let  $V$  and  $W$  and  $Z$  be vector spaces over  $F$ . Let  $T: V \rightarrow W$  and  $U: W \rightarrow Z$  be linear transformations.

- (a) If  $UT$  is one-to-one, show that  $T$  is one-to-one.
- (b) If  $UT$  is onto, show that  $U$  is onto.
- (c) Find an example where  $UT$  is onto but  $T$  is not onto.