

1. Let  $V = \{(x, y) \in \mathbb{R}^2 \mid x^2 - y^2 = 0\}$ .
  - (a) Is  $V$  closed under addition?  
No.
  - (b) Is  $V$  closed under scalar multiplication?  
Yes.
  - (c) Is  $V$  a subspace of  $\mathbb{R}^2$ ?  
No.
2. Let  $P_2$  be the set of all polynomials of degree 2 or less. Let  $T : P_2 \rightarrow \mathbb{R}$  be given by  $T(p(x)) = p(1)$ . Is  $T$  a linear transformation? Why or why not?  
 $T$  is linear. To show this, one only needs to directly check the definition of a linear transformation.