

1. Let  $X$  be an infinite dimensional LCTVS, let  $X^*$  be its dual space, and let  $p$  be a  $\sigma(X, X^*)$ -continuous seminorm on  $X$ . Prove that  $p$  is not a norm.
2. Let  $X$  be a LCTVS. Let  $E$  and  $F$  be convex subsets of  $X$ . Suppose that  $E$  is compact and that  $F$  is closed. Prove that  $E - F$  is closed.
3. Let  $X$  be an infinite dimensional Banach space.
  - (i) Prove that  $B = \{x \in X \mid \|x\| \leq 1\}$  is weakly closed.
  - (ii) Prove that  $S = \{x \in X \mid \|x\| = 1\}$  is not weakly closed.