

## Math 6140: Homework 7

1. 13.5: 3, 4, 6, 7, 10
2. Suppose  $\text{char}(\mathbb{F}) = p > 0$ , and  $\mathbb{K}/\mathbb{F}$  is an algebraic extension. Show that the following are equivalent.
  - (a) The only elements in  $\mathbb{K}$  that are roots of a separable polynomial in  $\mathbb{F}[x]$  are in  $\mathbb{F}$ .
  - (b) If  $\alpha \in \mathbb{K}$ , then there exists  $n \in \mathbb{Z}_{\geq 0}$  such that  $\alpha^{p^n} \in \mathbb{F}$ .
3. 13.6: 6, 8, 11, 12