

Math 81. *Abstract Algebra*.

**Homework 5.** Due on Wednesday, 2/18/2009.

1. Let  $K/F$  be an algebraic field extension.
  - (a) Suppose that  $\sigma : K \rightarrow K$  is an injective ring homomorphism that fixes  $F$  point-wise. Show that  $\sigma$  is an automorphism of  $K$ .
  - (b) Suppose that  $K$  has the property that any irreducible polynomial in  $F[x]$  having one root in  $K$  splits in  $K$ . Let  $\overline{F}$  be an algebraic closure of  $F$  and show that any injective ring homomorphism  $\sigma : K \rightarrow \overline{F}$  which fixes  $F$  is an automorphism of  $K$ .
2. Page 567, problem 6.
3. Page 567, problem 7.