

ASSIGNMENT 9

DUE FRIDAY, NOVEMBER 14, 2003.

Reading. The rest of section 5.6 of Herstein.

Herstein problems.

- Section 5.6, problems 12, 13, and 18.

Other problems.

1. Let $f \in F[x]$ be a polynomial of degree n , and let K be a splitting field for f . Prove that $[K : F]$ divides $n!$.
2. Let $F \subseteq L \subseteq K$ be fields. Prove or disprove:
 - (a) If K is normal over F , then K is normal over L .
 - (b) If K is normal over F , then L is normal over F .
 - (c) If L is normal over F and K is normal over L , then K is normal over F .
3. Prove that every normal extension F of \mathbb{Q} whose automorphism group is isomorphic to the Klein 4-group is biquadratic: i.e., there exist $a, b \in \mathbb{Q}$ such that $F = \mathbb{Q}(\sqrt{a}, \sqrt{b})$.