

Week 7 Field extensions, Automorphism groups and Galois Extensions
Jacobson I: 4.1, 4.3, 4.4

1. Jacobson I 4.1.1
2. Jacobson I 4.1.4
3. Jacobson I 4.1.5
4. Jacobson I 4.1.6
5. Jacobson I 4.1.8
6. Jacobson I 4.1.9
7. Let $E = \mathbf{Q}(r)$ where $r^3 + r^2 - 2r - 1 = 0$. Verify that $r' = r^2 - 2$ is also a root of $x^3 + x'^2 - 2x - 1 = 0$. Determine $\text{Aut}(E/\mathbf{Q})$ and show that E/\mathbf{Q} is a Galois extension. Do the same steps for $E_2 = \mathbf{Q}(r)$ where $r^3 - 3r - 1 = 0$. Verify that $r' = 2 - r^2$ is also a root of the latter polynomial. Determine $\text{Aut}(E_2/\mathbf{Q})$.
8. Jacobson I 4.5.6