Math 560, Field Theory, Spring 2012
Homework 8, due Tuesday 5/15

Read sections:
1. 14.3 (for 5/11)
2. 14.4 (for 5/14)
3. 15.1

Do the following problems:
1. Let $f \in K[x]$ and $L$ be a splitting field for $f$ over $K$. Show that $\sigma(\delta) = \varepsilon(\delta)$ for all $\sigma \in \Gamma(L : K)$ where
   \[ \varepsilon_{\sigma} = \begin{cases} 
   1 & \text{if } \sigma \text{ is even} \\
   -1 & \text{if } \sigma \text{ is odd} 
   \end{cases} \]

2. Suppose that $f(x) = x^3 + px + q \in K[x]$. Demonstrate that $\Delta = -4p^3 - 27q^2$.

3. 14.4

4. Compute the roots of $f = x^3 + 2x^2 + 3x + 4$ and compute $\Gamma_{\mathbb{Q}}(f)$.

The grader will carefully consider 2, 14.4.