Written Homework #12 (Revised)

Due at the beginning of class 04/29/2009

The problems are from our text. You may use the following:

(A) Suppose that $E$ is a field extension of $F$ and $f(x) \in F[x]$. Then $\sigma \in \text{Gal}(E/F)$ permutes the roots of $f(x)$ in $E$.

(B) Suppose that $E$ is a field extension of $F$ and $E = F(S)$. If $\sigma, \tau \in \text{Gal}(E/F)$ and $\sigma(s) = \tau(s)$ for all $s \in S$ then $\sigma = \tau$.

(C) Let $p, q \in \mathbb{Z}$ be distinct primes (positive or negative). Then $[Q(\sqrt{p}, \sqrt{q}) : Q] = 4$.

(D) Suppose $E$ is a field extension of $F$ and $a, b \in E$ satisfy $[F(a) : F], [F(b) : F]$ are finite and are relatively prime. Then $[F(a, b) : F]$ is finite and $[F(a, b) : F] = [F(a) : F][F(b) : F]$.

3. Page 561, number 12. Find generators and relations for the Galois group of $x^3 - 2$ over $Q$.
4. Page 561, number 16.