

Math 540B - Homework #3

1. Assume that $[F(\alpha) : F] = m$ and $[F(\beta) : F] = n$ where $\gcd(m, n) = 1$. Prove that $[F(\alpha, \beta) : F] = mn$.
2. Prove that $[\mathbb{Q}(2^{1/3}, i) : \mathbb{Q}] = 6$.
3. Prove that $[\mathbb{Q}(2^{1/2}, i) : \mathbb{Q}] = 4$.
4. Let $\alpha = (1 + 3^{1/4})^{1/3}$. Show that $[\mathbb{Q}(\alpha) : \mathbb{Q}] = 12$.