Homework 3

Due Wednesday, April 24, at noon

You are encouraged to work together with others, but you must write up the solutions on your own. All numbered exercises are from Dummit and Foote, third edition.

1. 13.2.18

2. 13.5.7

3. 13.6.6

4. Let α be a real number such that $\alpha^4 = 5$.

    (a) Is $\mathbb{Q}(i\alpha^2)$ normal over $\mathbb{Q}$?

    (b) Is $\mathbb{Q}(\alpha + i\alpha)$ normal over $\mathbb{Q}(i\alpha^2)$?

    (c) Is $\mathbb{Q}(\alpha + i\alpha)$ normal over $\mathbb{Q}$?

5. Let K be a field of characteristic p. If L is a finite extension of K such that $[L : K]$ is relatively prime to p, show that L is separable over K.