18.702 Algebra II

Spring 2008

May 2, 2008

18.702 Problem Set 10

due wednesday, May 14

1. Chapter 14, Problem 3.4.
2. Chapter 14, Problem 3.11a.
3. Chapter 14, Problem 6.31c.
4. Chapter 14, Problem 8.4.
5. Chapter 14, Misc. Problem 1.
6. Determine the Galois groups of the splitting fields of the following polynomials over $\mathbb{Q}$:
   (a) $x^4 - x^3 + x^2 - x + 1$,
   (b) $x^4 + 2x^3 + x^2 + 3x + 2$,
   (c) $x^4 + x + 1$,
   (d) $x^4 + 4x^2 + 2$.

7. (suggested by Galyna Dobrovolska) Let K/F be a Galois extension. If we think of K as an F-vector space, we obtain a representation of the Galois group G. Let χ denote the character of this representation. Show that if F contains enough roots of unity, then χ is the character of the *regular representation*.