

Abstract Algebra B

Math 521B

Michael E. O'Sullivan

Review for third exam

- Be able to define precisely the following terms. Be careful about the logic in the definition!
 - transcendental element, algebraic element, minimal polynomial (Thm. 10.6).
 - algebraic extension, simple extension, finitely generated extension, splitting field.
- Know some standard examples over \mathbb{Q} and \mathbb{R} .
 - Find the minimal polynomial of some simple examples (e.g. $\sqrt{2+i}$).
 - Find bases for extensions: (e.g. $\mathbb{Q}(\sqrt{2}, \sqrt{3})$ over \mathbb{Q}).
 - Know the theorems and exercises about the dimension about a composite extension (Thm 10.10, Ex. 10.#7, 8, 9, 11, 13).
- Know how to work with finite fields.
 - Know the Freshman's rule (see also Ex. 10.6# 10, 12).
 - Know the existence and uniqueness theorem.
 - Know that the multiplicative group of a finite field is cyclic.
 - Know that a finite field is a simple extension of a prime field.
 - Given an irreducible polynomial whose root α generates the multiplicative group of \mathbb{F}_{p^n} , construct the dictionary between powers of α and polynomials in α .
 - Use the dictionary to compute.