

MATH 101A: HOMEWORK

9. HOMEWORK 9

The following problems are due Thursday (Dec 6). I will post the answers after I grade it.

9.1. (p. 320, #1 (b),(c),(d)) Find the Galois group of the polynomial

$$X^3 - 10$$

over the fields:

- (b) \mathbb{Q}
- (c) $\mathbb{Q}(\sqrt{2})$
- (d) $\mathbb{Q}(\sqrt{3})$

9.2. (p. 254, #16) Let $\text{char} K = p$. Let α be algebraic over K . Show that α is separable if and only if $K(\alpha) = K(\alpha^{p^n})$ for all positive integers n .

9.3. (p. 323, # 15) Let K/k be a Galois extension and let F be an intermediate field between k and K . Let H be the subgroup of $\text{Gal}(K/k)$ mapping F into itself.

$$H = \{\sigma \in \text{Gal}(K/k) \mid \sigma(F) \subseteq F\}$$

Show that H is the normalizer of $\text{Gal}(K/F)$ in $\text{Gal}(K/k)$.