

PRACTICE PROBLEMS FOR EXAM 3

- Exam 3 is on Wednesday, November 19th. It will be a closed-book exam covering Sections 4.3, 4.4, 5.1, 5.2, 5.3, and 6.1 of the textbook. Only pens, pencils, and erasers will be allowed. Calculators, laptops, and phones, will not be allowed.
- Although the exam will not contain specific problems from previous sections, you must be familiar with the material from some of them, in particular, Sections 3.1, 3.2, 3.3, 4.1, and 4.2, as they are prerequisite material.
- The proposed practice problems below are in the textbook, T. W. Hungerford, *Abstract Algebra, An Introduction*. **Third Edition**, Brooks Cole, 2012.

- (1) Pages 103–104: 1–7, 9–14, 16, 20–23.
- (2) Pages 110–111: 2–6(a)(b), 7–9, 15, 16, 20, 21.
- (3) Page 129: 1–7, 9, 12.
- (4) Pages 134–135: 1–11, 14, 16.
- (5) Consider the field $K = \mathbb{Z}_2[x]/(x^2 + x + 1)$. Represent K as $\{0, 1, \alpha, \alpha + 1\}$ where $\alpha = [x]$, and find the elements in K that are roots of the polynomial $x^4 + x \in \mathbb{Z}_2[x]$. *Hint:* In K , $\alpha^2 = \alpha + 1$, so $\alpha^4 = \alpha^2 + 1 = \alpha$.
- (6) Pages 138–139: 1–3, 6, 7, 9.
- (7) Pages 148–151: 1–7(a)(b), 11, 13, 15, 16, 17(a), 18–23, 28, 29, 32, 43, 45(a)(b).