

STUDY GUIDE FOR THE FINAL EXAM

- The final exam is on
*** **Friday, December 12, from 3:30 to 5:30 PM** ***
- The venue is our usual classroom, GMCS-313.
- The final exam will be a closed-book exam. Only pens, pencils, and erasers will be allowed. Calculators, laptops, and phones, will not be allowed.
- Although a large part of the exam will be focused on Sections 6.1, 6.2, 7.1, 7.2, and 7.3 of the textbook, you must be familiar with all the previous material covered in the course as it is prerequisite for the latter sections.
- The practice problems below give a good indicator of what you should know from previous chapters. They are in the textbook, T. W. Hungerford, *Abstract Algebra, An Introduction*. **Third Edition**, Brooks Cole, 2012.

- (1) Determine the all the units and zero divisors in the given rings:

$$\mathbb{Z}, \mathbb{Q}, \mathbb{Z} \times \mathbb{Z}, \mathbb{Z}_7, \mathbb{Z}_{15}.$$

- (2) Review the notions of ring homomorphism and isomorphism, in particular Theorem 3.10 and Corollary 3.11 on pp. 76 and 77.
- (3) Give a *precise* statement of the division algorithm in $R = \mathbb{Z}$. Do the same for $R = F[x]$, where F is a field.
- (4) Pages 148–151: 1–7(a)(b), 11, 13, 15, 16, 17(a), 18, 25–27, 29, 41, 45.
- (5) Pages 159–161: 1, 4, 6, 7, 8, 11, 12, 21, 26.
- (6) Let $D_7 = \{1, r, \dots, r^6, s, rs, \dots, r^6s\}$ be the dihedral group of degree 7, that is, the group of symmetries of a regular heptagon. What is the order of D_7 ? Determine rsr^3s and sr^5sr . Determine the order of each element of D_7 .
- (7) Pages 180–183: 1–11, 17, 19, 22, 23, 27–30.
- (8) Pages 201–202: 1–10, 13–15, 16(a), 22, 27–30. Read 26.
- (9) Pages 211–213: 1, 3, 4, 5, 14(a), 15(a), 40.