

MA 294: Applied Abstract Algebra / Spring 2022
Homework assignment #1
Due Thursday 1/27/2022 by 4pm

Edit 1/25/22: Ok to turn in (10) and (11) as part of HW #2 next week.

Turn in your work either in class or before 4pm in the envelope hanging on MCS 127. Please staple or otherwise connect the pages of your work. Definitely write your name on the front page. Consider using a pen rather than a pencil.

Most of this material is hopefully review for most of you!

Mathematical induction: Review section 4.3.

- (1) Solve exercise 4.3.2.
- (2) Prove the same statement as in exercise 4.3.2 directly, without using induction.

Functions: Read section 5.

- (3)–(6) Solve exercises 5.2.2, 5.3.3, 5.4.3, 5.4.4.

Divisibility: Read sections 8.1, 8.2, 8.4, 8.5. Note that Theorem 8.2 is the division algorithm (stated in class 1/20) for positive integers.

- (7) Let a, b, c be integers. Prove or disprove with a counterexample each of the following.
 - (a) If $a \mid b$ and $a \mid c$ then $a \mid (bx + cy)$ for any integers x, y .
 - (b) If $b \mid a$ and $c \mid a$ then $(b + c) \mid a$.
- (8) Exercise 8.4.1

Equivalence relations: Read sections 12.1 and 12.2.

- (9) Exercise 12.7.6

Edit 1/25/22: Ok to stop here for this week.

Integers modulo m : Read sections 13.1 and 13.2.

- (10) Exercise 13.1.1
- (11) Exercise 13.2.1