

For this homework, the rules are as follows:

- For questions from Chapter 1, you **do not** need to write down justifications involving Axioms 1.1-1.4. But you must write your steps so that only one thing is being used at a time.
- For questions from Chapter 2, you may write your arguments using familiar rules of arithmetic **so long as** you know how you would convert your argument into a formal one using the techniques of Chapter 1. If in doubt, write out the argument, and I can let you know if the argument is correct.

Proposition 1.22:

(i) For all $m \in \mathbb{Z}$, $-(-m) = m$.

(ii) $-0 = 0$.

Proof. Your proof goes here.

□

Proposition 1.25(iii): For all $m, n \in \mathbb{Z}$,

$$(-m) \cdot n = m \cdot (-n) = -(m \cdot n).$$

Proof. Your proof goes here.

□

For full credit on this one, you should base your proof on Proposition 1.25(ii).

Proposition 2.3: $1 \in \mathbb{N}$.

Proof. Your proof goes here.

□

Hint: Use proof by contradiction. The first line of the proof will be:

“Suppose to the contrary that $1 \notin \mathbb{N}$.”

Take advantage of Proposition 2.2 and show that this leads to a contradiction.

Proposition 2.5: For each $n \in \mathbb{N}$ there exists $m \in \mathbb{N}$ such that $m > n$.

Proof. Your proof goes here.

□

We'll define the symbol $<$ on Monday, but you can read about it on page 15.

Proposition 2.7(iv): Let m, n , and $p \in \mathbb{Z}$. If $m < n$ and $p < 0$ then

$$np < mp.$$

Proof. Your proof goes here.

□

Proposition 2.9: Let $m \in \mathbb{Z}$. If $m \neq 0$ then $m^2 \in \mathbb{N}$.

Proof. Your proof goes here.

□

Proposition 2.10: The equation $x^2 = -1$ has no solution in \mathbb{Z} .

Proof. Your proof goes here.

□