Recitation 5

- Feel free to solve this collaboratively during recitation, and ask (and answer) questions about this problem set on Piazza.
- This is an **optional** problem set; do not turn this in for grading.
- While you don't have to turn this in, be warned that this material **can** appear in a quiz or exam.

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1. Indicate which of the following relationships are true and which are false, together with a brief explanation in words why you think that is the case:

(a) $Z^+ \subseteq Q$.
(b) $Q \subseteq Z$.

(c) $Q \cap R = Q$.
(d) $Z^+ \cap R = Z^+$.
(e) $\emptyset \subset \mathbb{N}$.

2. Prove each of the following for all sets A, B, C in a universal set $\mathbb{U}$:
   (a) $A \oplus (B \oplus C) = (A \oplus B) \oplus C$.
   (b) $A \oplus \emptyset = A$.
   (c) $A \oplus A = \emptyset$
   (d) If $A \oplus C = B \oplus C$, then $A = B$.
3. Either prove the following statement, or disprove it using a counter-example.

   For all sets A, B, C, if $B \bigcap C \subseteq A$, then $(A - B) \bigcap (A - C) = \emptyset$.

4. A pair of sets are called *disjoint* if their intersection is the empty set. Prove that two finite sets A and B are disjoint if and only if $|A| + |B| = |A \cup B|$.