SI 10: Set Theory and Logic

Assume that all sets mentioned here are subsets of a set X.

1 Drawing Sets

Draw Diagrams for the following:

1. $(A \cup B) \cap C \to A \cup B$
2. $A \to (A \setminus B)$
3. $A \to (A \setminus B) \cap B$
4. $(A \cup C) \setminus (A \cap C)$
5. $(A \cap C) \setminus (A \cup C) \to (A \setminus B) \cap B$

In logic, there is the concept of negation, denoted by the operator "$\neg$", and it is read as "not". So "$\neg A$" is read as "not A". Now, using only previously defined operators:

6. Come up with a definition for $\neg$. In other words, $\neg A \iff ?$

2 Set Proofs

Using only the set rules defined on the next page, prove the following:

7. $(A \cup B) \cup C = A \cup (B \cup C)$
8. $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

Set Rules

1. $D \cup E \subseteq F \iff D \subseteq F$ and $E \subseteq F$
2. $D \subseteq E \cap F \iff D \subseteq E$ and $D \subseteq F$
3. $D \subseteq E \cup F \iff D \setminus E \subseteq F$
4. $\cup$ and $\cap$ are commutative