Foundations of mathematics – week 4
October 30, 2009

Exercises

1. Let A be a set with n elements and B a set with m elements. How many elements are there in the set $A \cup B$, $A \cap B$, $A - B$?
2. Do the following equalities hold for arbitrary sets A, B, C
   (a) $A - (B \cup C) = (A - B) - C$;
   (b) $A - (B - C) = (A - B) \cup C$;
   (c) $(A \cup B \cup C) - (A \cup B) = C$;
   (d) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$?
3. Prove that
   (a) if $A - B = B - A$ then $A = B$;
   (b) if $A \cup B = C$ then $C - B = A - B$;
   (c) if $A \cup B \subseteq A \cap B$ then $A = B$.
4. Let X be a set with n elements. How many elements are there in the set $P(X)$?
5. Do the following equalities hold
   (a) $P(A \cup B) = P(A) \cup P(B)$;
   (b) $P(A \cap B) = P(A) \cap P(B)$?

Homework

1. Do the following equalities hold for arbitrary sets A, B, C
   (a) $A \cup (A \cap B) = A$;
   (b) $A - (B \cup C) = (A - B) \cup (A - C)$;
   (c) $(A - B) - C = A - (B \cup C)$?
2. Let $A, B, C \subseteq \mathcal{D}$. Prove the following equivalence

$$A \cap C \subseteq B \leftrightarrow C \subseteq -A \cup B$$