

MATH 111

Homework 1

Prove the following properties first formally using the definitions and then by drawing the Venn Diagrams.

1. Let A, B, C be three arbitrary sets.

- (a) $A \cup B = B \cup A$
- (b) $A \cap B = B \cap A$
- (c) $(A \cup B) \cup C = A \cup (B \cup C)$
- (d) $(A \cap B) \cap C = A \cap (B \cap C)$
- (e) $A \cup \emptyset = A$
- (f) $A \cap \emptyset = \emptyset$
- (g) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
- (h) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

2. Let A be a subset of B . Let C be a set.

- (a) $A \cap B = A$
- (b) $A \cup B = B$
- (c) $A \cap C \subseteq B \cap C$
- (d) $A \cup C \subseteq B \cup C$
- (e) $A \setminus C \subseteq B \setminus C$
- (f) $C \setminus B \subseteq C \setminus A$