MATH 215 **Set Operations Identities**

1. **Associativity**
   (a) $A \cap (B \cap C) = (A \cap B) \cap C$.
   (b) $A \cup (B \cup C) = (A \cup B) \cup C$.
   (c) $A\Delta(B\Delta C) = (A\Delta B)\Delta C$.

   (a) $A \cap (B \cap C) = (A \cap B) \cap C$.
   (b) $A \cup (B \cup C) = (A \cup B) \cup C$.
   (c) $A\Delta(B\Delta C) = (A\Delta B)\Delta C$.

2. **Commutativity:**
   (a) $A \cap B = B \cap A$.
   (b) $A \cup B = B \cup A$.
   (c) $A\Delta B = B\Delta A$.

3. **Distributivity:**
   (a) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.
   (b) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$.

4. **De-Morgan:**
   (a) $A \setminus B = A \cap B^c$.
   (b) $(A \cup B)^c = A^c \cap B^c$.
   (c) $(A \cap B)^c = A^c \cup B^c$.
   (d) $A\setminus(B\cap C) = (A\setminus B)\cup(A\setminus C)$
   (e) $A \setminus (B \cup C) = (A \setminus B) \cap (A \setminus C)$.

5. **Empty set Identities:**
   (a) $A \cap \emptyset = \emptyset$.
   (b) $A \cup \emptyset = A$.
   (c) $A \setminus \emptyset = A$.
   (d) $\emptyset \setminus A = \emptyset$.
   (e) $A\Delta\emptyset = A$.

6. **A set with itself:**
   (a) $A \cap A = A$.
   (b) $A \cup A = A$.
   (c) $A \setminus A = \emptyset$.
   (d) $A\Delta A = \emptyset$.