Math 1324
Section 5.1 Part 2
Set Operations

The videos corresponding to this worksheet can be found at
https://online.math.uh.edu/Math1324/.
UH students can also view the videos within the Math 1324 textbook.

Set Complementation

Let U be a universal set and A be a subset of U, then

1. $U^c = \varnothing$

2. $\varnothing^c = U$

3. $(A^c)^c = A$

4. $A \bigcup A^c = U$

5. $A \bigcap A^c = \varnothing$

Set Operations

Let U be a universal set. If A, B, and C are arbitrary subsets of U, then

1. $A \cup B = B \cup A$

2. $A \cap B = B \cap A$

3. $(A \cup (B \cup C)) = ((A \cup B) \cup C)$

4. $(A \cap (B \cap C)) = ((A \cap B) \cap C)$

5. $(A \cup (B \cap C)) = (A \cup B) \cap (A \cup C)$

6. $(A \cap (B \cup C)) = (A \cap B) \cup (A \cap C)$

De Morgan's Laws

Let A and B be sets. Then

1. $(A \cup B)^c = A^c \cap B^c$

2. $(A \cap B)^c = A^c \cup B^c$

These laws can be extended out to a finite number of sets.

Example: Let U={1, 2, 3, 4, a, b, c, d},
A={2, 4, a, c, d}, B={1, 2, b, c}, and
C={2, 4, a, c, d}.
Find the given sets.
a. $(A \cap C)$

b. $(B^c \cap A)$

Example: Let U={1, 2, 3, 4, a, b, c, d},
A={1, 4, a, b, d}, B={2, 3, b, c}, and
C={3, 4, c, d}.
Find the given sets.

a. $(C \cup A)$

b. $(C^c \cap B^c)$

Example: Let U={1, 2, 3, 4, a, b, c, d},
A={2, 3, 4, a}, B={1, 3, a, b, c}, and
C={1, 2, 4, a, d}.
Find the given set. $((A \cap B)^c \cup C)$

Example: Let U={1, 2, 3, 4, a, b, c, d},
A={3, 4, b, c}, B={1, 4, a, c}, and
C={2, 3, 4, a, c, d}.
Find the given set. $((A^c \cup C) \cap B^c)$

Example: Let U denote the set of all children in a given 1st grade class. Let L=$\{x \in U|\ x$ likes lemon pie$\}$, A=$\{x \in U|\ x$ likes apple pie$\}$ and B = $\{x \in U|\ x$ likes blueberry pie$\}$.

Describe the given set in words.

a. $A \bigcap L$

The set of children in a given 1st grade class that

b. $((A \cup B) \cap L^c)$

The set of children in a given 1st grade class that

Example: Let U denote the set of all children in a given 1st grade class. Let L=$\{x \in U \mid x$ likes lemon pie$\}$, A=$\{x \in U \mid x$ likes apple pie$\}$ and B = $\{x \in U \mid x$ likes blueberry pie$\}$.

Describe the given statement in set notation.

a. The set of children in a given 1st grade class that like apple pie or blueberry pie.

b. The set of children in a given 1st grade class that do not like lemon pie or blueberry pie, but do like apple pie.