perplexity

search me about set operation

Set operations are actions performed on two or more sets to create a new set. The most common set operations are union, intersection, and difference[1] [2].

Basic Set Operations:

- **Union:** The union of sets A and B, denoted as $A \cup B$, includes all elements present in either A or B or both[1].
  - $A \cup B = \{x : x \in A \text{ or } x \in B\}$[1]
  - *Example*: If $A = \{1,2,3,4\}$ and $B = \{6,7\}$, then $A \cup B = \{1,2,3,4,6,7\}$[1]
- **Intersection:** The intersection of sets A and B, denoted as $A \cap B$, includes all elements that are common to both A and B[1].
  - $A \cap B = \{x : x \in A \text{ and } x \in B\}$[1]
  - *Example*: If $A = \{1,2,3\}$ and $B = \{3,4,5\}$, then $A \cap B = \{3\}$[1]
- **Difference:** The difference between sets A and B, denoted as A - B, includes all elements present in A but not in B[1].
  - $A - B = \{1,2,3,4,5\}$
  - *Example*: If $A = \{1,2,3,4,5,6,7\}$ and $B = \{6,7\}$, then $A - B = \{1,2,3,4,5\}$[1]
- **Complement:** The complement of a set X, denoted as X', includes all elements in the universal set U that are not in X[1].
  - $X' = \{a : a \in U \text{ and } a \notin A\}$[1]
  - *Example*: If $U = \{1,2,3,4,5,6,7,8\}$ and $A = \{1,2,5,6\}$, then $A' = \{3,4,7,8\}$[1]

Properties of Set Operations:

- **Commutative Property:** The order of sets does not affect the result[1].
  - $A \cup B = B \cup A$[1]
  - $A \cap B = B \cap A$[1]
- **Associative Property:** Grouping of sets does not affect the result[1].
  - $A \cup (B \cup C) = (A \cup B) \cup C$[1]
  - $A \cap (B \cap C) = (A \cap B) \cap C$[1]
- **Distributive Property:** Distributing one operation over another[1].
  - $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$[1]
  - $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$[1]

Set operations can be grouped together using parentheses to force an order of operations[3]. When performing multiple set operations, the order is as follows[3]:

1. Operations within parentheses
2. Complements
3. Unions and intersections from left to right

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1. https://byjus.com/maths/set-operations/
2. https://www.vedantu.com/maths/set-operations
3. https://math.libretexts.org/Courses/Prince_Georges_Community_College/MAT_1130_Mathematical_Ideas_Mirtova_Jones_(PGCC:_Fall_2022)/01:_Sets/1.02:_Operations_with_Sets