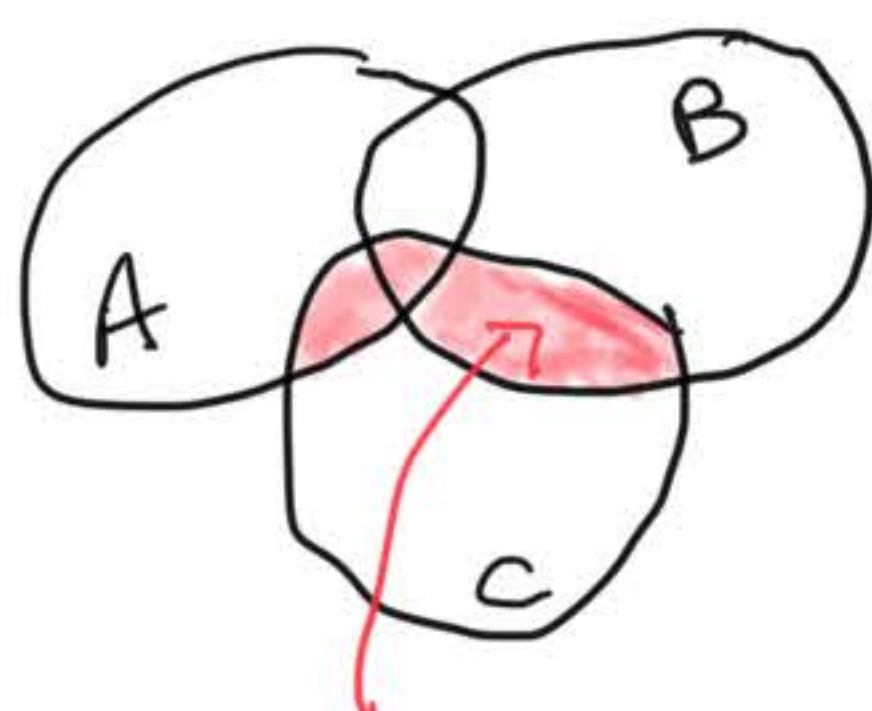
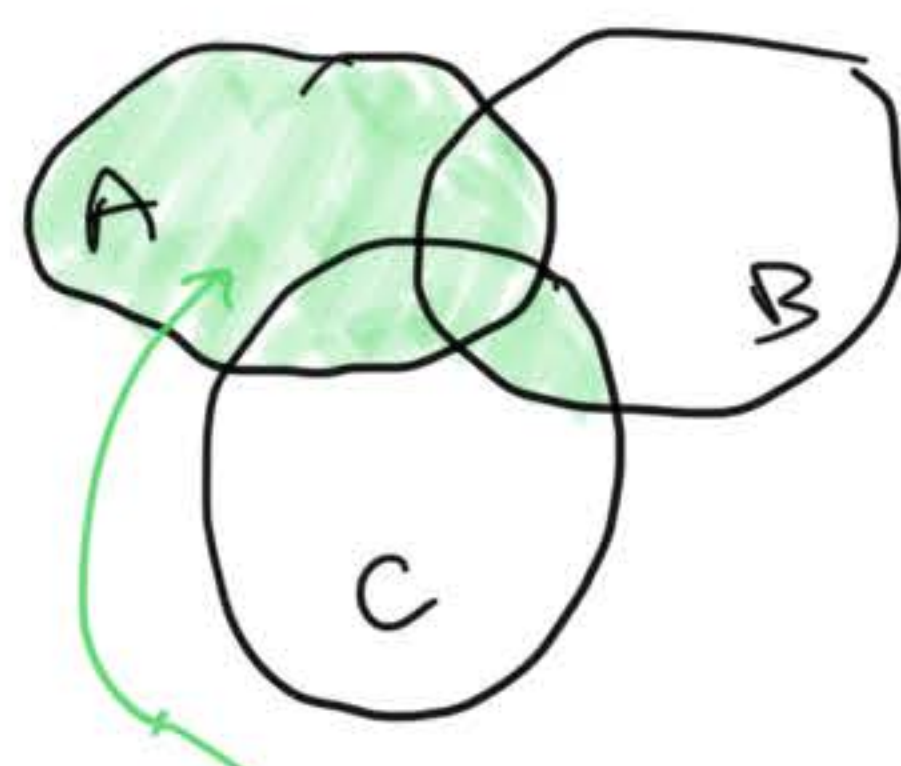


## Discussion Points, Class of Sept 14

- ① Discuss Part 1 of Project 3
- ② Use a 'decision tree' to list the 8 possible subsets of a set  $A = \{a_1, a_2, a_3\}$  with 3 elements. This generalizes to:  
Fact: If  $|A| = n$  then  $|\mathcal{P}(A)| = 2^n$
- ③ Union and intersection are associative operations:  
 $(A \cup B) \cup C = A \cup B \cup C = A \cup (B \cup C)$   
 $(A \cap B) \cap C = A \cap B \cap C = A \cap (B \cap C)$
- ④ If  $A_1, A_2, \dots, A_n$  are sets then  
 $A_1 \cup A_2 \cup \dots \cup A_n = \{x \mid x \in A_i \text{ for some } 1 \leq i \leq n\}$   
 $A_1 \cap A_2 \cap \dots \cap A_n = \{x \mid x \in A_i \text{ for all } 1 \leq i \leq n\}$
- ⑤  $(A \cup B) \cap C = A \cup (B \cap C)$  is not a law of set theory. This means that  $(A \cup B) \cap C$  and  $A \cup (B \cap C)$  are not equal for all sets  $A, B$  and  $C$ . However they may be equal for some  $A, B$  and  $C$ .  
Use Venn diagrams to see this.
- ⑥ The Venn diagram picture suggests a true statement: "If  $A, B, C$  are sets with  $A \subseteq C$  then  $(A \cup B) \cap C = A \cup (B \cap C)$ ."
- ⑦ Venn diagrams for ⑤ and ⑥:



$(A \cup B) \cap C$



$A \cup (B \cap C)$