Discuss with your partner(s)

For problems 1–3, you can assume $A, B,$ and C are all subsets of some universal set U.

FYI, sketching a Venn diagram often helps me build some intuition for how to approach a proof.

1. Prove $A = (A \cap C) \cup (A - C)$

2. Prove $A \subseteq B$ iff $B^c \subseteq A^c$

3. Are the following statements true or false? Prove your conclusions.

   (a) If $A \cap C \subseteq B \cap C$, then $A \subseteq B$

   (b) If $A \cup C \subseteq B \cup C$, then $A \subseteq B$

   (c) If $A \cup C = B \cup C$, then $A = B$

   (d) If $A \cap C = B \cap C$, then $A = B$

   Sundstrom, Exercise 5.2.13

4. If $|A| = 2$, what is $|P(A)|$? If $|A| = 3$, what is $|P(A)|$? If $|A| = 4$, what is $|P(A)|$?

   If $|A| = n$, make a conjecture for $|P(A)|$