Name: _____ (key) _____

1. Show: There exist sets A and B such that $|A \backslash B| \neq |A| - |B|$.

Consider : $A = \{1, 2\}$
$B = \{2, 3\}$

Observe : $|A \backslash B| = 1$
$|A| - |B| = 2 - 2 = 0$

Note: There are <u>many</u> possible answers

2. Show: There exist sets A and B such that $A \cup B = A \cap B$.

Consider : $A = \emptyset$
$B = \emptyset$

Observe : $A \cup B = \emptyset \cup \emptyset = \emptyset$
$A \cap B = \emptyset \cap \emptyset = \emptyset$

Note: There are <u>many</u> possible answers

3. Let A and B be arbitrary sets in some universe $\mathcal{U}$

(a) Show: $A \cap B \subseteq A$.

Let $x \in A \cap B$.
So $x \in A$ and $x \in B$.
In particular $x \in A$.
Therefore $A \cap B \subseteq A$.

(b) Show: $A \subseteq A \cup B$.

Let $x \in A$.
So $x \in A$ or $x \in B$.
Therefore $x \in A \cup B$.
Hence $A \subseteq A \cup B$.