Math 266 Homework 1 due Friday September 2

(1) Identify whether each of the following are true or false. Explain why.
   a. $2 \in \{1, 2, 3, 4\}$
   b. $2 \subseteq \{1, 2, 3, 4\}$
   c. $\emptyset \in \{1, 2, 3, 4\}$
   d. $\emptyset \subseteq \{1, 2, 3, 4\}$

(2) Give an example of sets $A$ and $B$ such that $A \subseteq B$ and $A \in B$.

(3) Let $S = \{1, 2, 3, 4, 5\}$. Put the set $A$ in set roster notation where
   $$A = \{3x + 1 : x \in \mathbb{Z} \text{ and } 2x/3 \in S\}$$

(4) Express $\mathcal{P}(\{a, b, \{a, b\}\})$ in set roster notation.

(5) Let $A = \{1, 2, 3, 4, 5, 6\}$, $B = \{1, 3, 7\}$, and $C = \{2, 6, 8\}$. Express the following set in set roster notation.
   $$A \cap B \cup C$$

(6) Make a Venn-diagram for the set $\overline{A \cup B} \cup (A \cap C)$. Show the steps by making a Venn-diagram for each set operation.

(7) Let $A_n = (-3 + 1/n, 3 - 1/n)$ for $n \in \mathbb{N}$. Give the following sets in interval notation.
   $$\cap_{n \in \mathbb{N}} A_n \quad \text{and} \quad \cup_{n \in \mathbb{N}} A_n$$