1. Find a collection of open intervals $S_n = (?, ?)$ enumerated by the natural numbers with

$$\underset{n \in \mathbb{N}}{\cap} S_n = [-1, 1]$$

2. SKIP.

3. Which of the following sentences are statements? For those that are, indicate the truth value.

   (a) The number 16 is prime.

   (b) Is it true that $3 \cdot 4 = 12$?

   (c) $3 \cdot 4 = 12$.

   (d) $\emptyset \in \emptyset$

   (e) $\emptyset \subseteq \emptyset$

   (f) $\emptyset \in \{\emptyset\}$

   (g) $\emptyset \subseteq \{\emptyset\}$

4. Suppose $p(x)$ is the open sentence $2x^2 + 5x - 3 = 0$.

   (a) Over the domain $\mathbb{R}$ for which $x \in \mathbb{R}$ is this statement true? For which is it false? Write these in set notation.

   (b) Over the domain $\mathbb{Z}$ for which $x \in \mathbb{Z}$ is this statement true? For which is it false? Write these in set notation.

5. Suppose $p(A)$ is the open sentence $A \not\subseteq \{1, 2\}$. For which $A \in \mathcal{P}(\{1, 2, 3\})$ is this statement true? Write this in set notation.

6. Sketch the subset of $\mathbb{Z} \times \mathbb{Z}$ given by $\{(x, y) \mid x, y \in \mathbb{Z} \times \mathbb{Z} \text{ and } 2x - y \leq 1\}$