Practice Midterm 1

1. Show that the intersection of infinitely many regular languages may not be regular.
2. Consider the language

$$L := \{1^k \# y : k \geq 1, y \in \{0,1\}^* \text{ and } y \text{ contains at least k ones } \}$$

   defined over the alphabet $\{0, 1, \#\}$. Prove or disprove that L is regular.
3. Consider the language

$$L := (1101 \cup 11)^*$$

   Give a minimal DFA for L and prove that it is minimal
4. Show that every infinite Turing-recognizable language has an infinite decidable subset.