1. Problem 3.9, Sipser’s book.

2. Let $S$ be an infinite, Turing-recognizable language. Prove that $S$ has an infinite, decidable subset.

3. Define the language

$$A = \{ \langle M \rangle \mid M \text{ is a nondeterministic finite automaton (NFA) that only accepts palindromes in } \{0,1\}^* \}.$$ 

(Note that for $\langle M \rangle$ to be in $A$, it need not accept all palindromes, but any string it accepts must be a palindrome.) Prove that $A$ is **decidable**.


5. * (Optional problem) Show that single-tape TMs that cannot write on the portion of the tape containing the input can only recognize regular languages.