Theory of Computation, Fall 2023
Quiz 3

Q1. Show that the following language is decidable. You may use any conclusion that we have proved in class.

$$S = \{\text{``}M\text{''} \text{ is a DFA and } M \text{ accepts } w^R \text{ whenever it accepts } w\}$$

Q2. Prove that the following language is not recursive. You may reduce from any language that has been proved to be non-recursive in class.

$$A = \{\text{``}M_1\text{''}\text{``}M_2\text{''} : M_1 \text{ and } M_2 \text{ are two Turing machines with } L(M_1) \cap L(M_2) \neq \emptyset\}$$

Q3. Show that the following language is recursively enumerable.

$$A = \{\text{``}M\text{''} : M \text{ is a TM, and } L(M) \text{ contains at least 2023 palindromes}\}$$

Recall that a string w is a palindrome if $w = w^R$.

Bonus

Q4. Let $A = \{0^n 1^n : n \geq 0\}$. Let B be any language. Show that B is recursive if and only if $B \leq A$