Introduction to Theoretical Computer Science, Fall 2024
Assignment 7 (Due November 18 Monday 4:00 pm)

Only part I will be graded.

1 Part I

Q1. Show that the following language is recursive.

$$\text{INF}_{\text{DFA}} = \{\text{“}A\text{”} : A \text{ is a DFA and } L(A) \text{ is an infinite language}\}$$

Q2. Show that the following language is not recursive by reducing A_{TM} to it.

$$\text{INF}_{\text{TM}} = \{\text{“}M\text{”} : M \text{ is a Turing machine and } L(M) \text{ is an infinite language}\}$$

2 Part II

Q3. Show that the following language is recursive. You may use the fact that EQ_{DFA} is recursive.

$$S = \{\text{“}A\text{” is a DFA that always accepts } w^R \text{ whenever it accepts some string } w.\}$$

Q4. Show that the following language is not recursive.

$$\{\text{“}M_1\text{”“}M_2\text{”“k”} : M_1 \text{ and } M_2 \text{ are two Turing machines with } |L(M_1) \cap L(M_2)| \geq k\}$$