Theory of Computation, Fall 2023
Assignment 8 (Due December 6 Wednesday 10:00 am)

Q1. Prove that the following language is not recursive, but is recursively enumerable.

$$L_1 = \{\text{“}M\text{”} : M \text{ is a Turing machine that halts on at least 2023 strings.}\}$$

Q2. Prove that the following language is not recursively enumerable.

$$L_2 = \{\text{“}M\text{”} : M \text{ is a Turing machine that halts on at most 2022 strings.}\}$$

Q3. Prove that the following language is not recursively enumerable. (Hint: you may reduce $\overline{H}$ to L_3.)

$L_3 = \{\text{“}M\text{”} : M$ is a Turing machine such that there are at least 2023 strings on which M does not halt.$\}$