Lab14-Computability

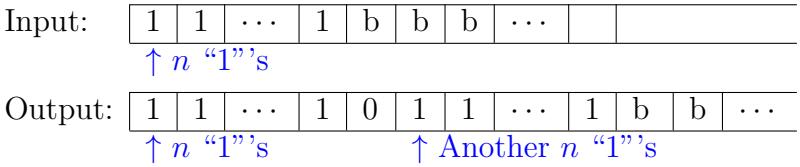
CS101-计算机科学导论课后作业，讲师：John Hopcroft，2016 秋季学期

* 可打印本页直接在页面作答/附纸装订。标注您的 姓名：---------- 学号：---------- 班级：------
* 电子版作业请直接上传到课程网站

1. The set of all finite length strings over a finite alphabet is countably infinite. What is the cardinality of the set of finite length strings over a countably infinite alphabet?

2. The transition function (also named as *instruction* or *specification*) of a Turing Machine (TM) $\delta : S \times \Gamma \to S \times \Gamma \times \{L, R\}$ describes the rules of each computation step. E.g., $\langle q_i, 1\rangle \to \langle q_j, 0, R\rangle$ means when reads an "1" on the tape with the current state as q_i, the TM will turn to the state q_j, replace the "1" as a "0", and then move one cell to the right.

   Given $\Sigma = \{0, 1\}$, $\Gamma = \{0, 1, b\}$ (b as blank symbol appears initially in all except the finite number of inputs), design an one-tape TM $M = (Q, \Sigma, \Gamma, \delta, q_0, b, F)$ to accomplish the "copy" operation, whose initial configuration is n "1"'s, and the output should be two series of n "1"'s with a 0 as separation (Shown as follows). Describe your design and write down its transition functions.



3. Construct an Nondeterministic Finite Automaton (NFA) to accept all strings that start and end with the same symbol (with size $|s| \geq 1$) , and convert this NFA into a Deterministic Finite Automaton (DFA).