# Automata Theory - Homework II

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## 1 Instructions

1. The homework is due on April 8, in class.
2. Attempt as many problems as you can. You will be given partial credit.

## 2 Problems

1. Let $L$ be a regular language with finite alphabet $\Sigma$. Suppose that you are given the DFA $A$ representing $L$. Provide an algorithm to test whether $L = \Sigma^*$, i.e., whether $L$ includes all strings over its alphabet. (3 points)
2. Construct the minimum-state equivalent DFA for the DFA represented below. (5 points)

| | 0 | 1 |
|---|---|---|
| $\rightarrow A$ | $B$ | $E$ |
| $A$ | $B$ | $E$ |
| $B$ | $C$ | $F$ |
| $*C$ | $D$ | $H$ |
| $D$ | $E$ | $H$ |
| $E$ | $F$ | $I$ |
| $*F$ | $G$ | $B$ |
| $G$ | $H$ | $B$ |
| $H$ | $I$ | $C$ |
| $*I$ | $A$ | $E$ |

3. Design a CFG for the language $L = \{0^n 1^n | n \geq 1\}$, i.e., the set of all strings of one or more 0's, followed by an equal number of 1's. (2 points)