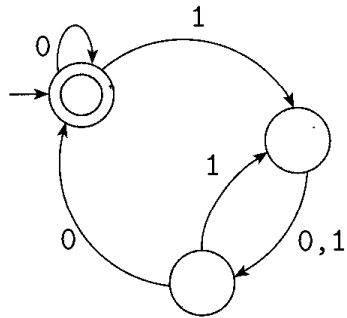


Decidability

Answer all parts for the following DFA M and give reasons for your answers.

1)



a. Is $\langle M, 0100 \rangle \in A_{\text{DFA}}$?

b. Is $\langle M, 011 \rangle \in A_{\text{DFA}}$?

c. Is $\langle M \rangle \in A_{\text{DFA}}$?

d. Is $\langle M, 0100 \rangle \in A_{\text{REX}}$?

e. Is $\langle M \rangle \in E_{\text{DFA}}$?

f. Is $\langle M, M \rangle \in EQ_{\text{DFA}}$?

2) Let $A_{\epsilon_{\text{CFG}}} = \{ \langle G \rangle \mid G \text{ is a CFG that generates the empty string} \}$

Show that $A_{\epsilon_{\text{CFG}}}$ is decidable.

Decidability

- 3) Show that the following language is decidable

$$ALL_{DFA} = \{ \langle A \rangle \mid A \text{ is a DFA and } L(A) = \Sigma^* \}$$

- 4) Show that the following language is Turing-recognizable

$$A_{\exists} = \{ \langle M \rangle \mid M \text{ is a Turing Machine that accepts some string in } \Sigma^n \}$$