Recitation 4 - Turing Machines

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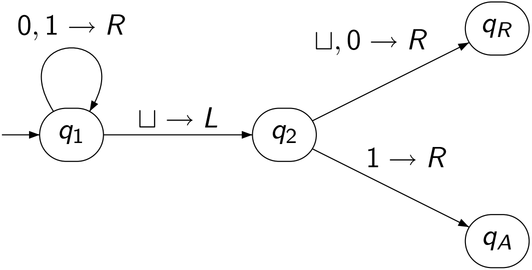
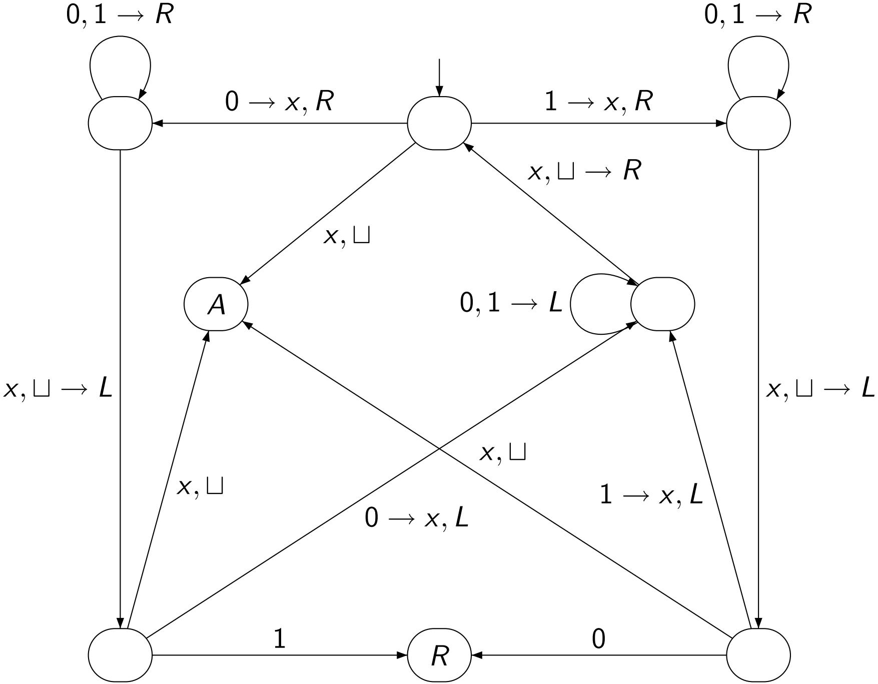

$0, 1 \rightarrow R$
q_1
$\sqcup \rightarrow L$
q_2
$\sqcup, 0 \rightarrow R$
q_R
$1 \rightarrow R$
q_A


0, 1 → R
0, 1 → R
0 → x, R
1 → x, R
x, ⊔ → R
x, ⊔
A
0, 1 → L
x, ⊔ → L
x, ⊔ → L
x, ⊔
x, ⊔
1 → x, L
0 → x, L
1
R
0

$$\{w\#t \mid w, t \in \{0,1\}^* \text{ and } w \neq t\}$$

Draw out the state diagram of a Turing machine which decides this language. Don't use your book.

$$\{w\#t \mid w, t \in \{0,1\}^* \text{ and no substring of } t \text{ is } w\}$$

How would you solve this problem with a normal Turing machine? How would you solve it with a nondeterministic Turing machine? Draw out the nondeterministic Turing machine.

$$\{w \mid w \text{ has an equal number of 0s, 1s, and 2s }\}$$

Give an implementation description for a Turing machine which decides this problem. This should be a slightly higher level description of the Turing machine similar to Example 3.11 and Example 3.12.

If you have more time also try

$$\{x\#y\#z \mid x, y, z \in \{0,1\}^* \text{ and } x + y = z\}$$

A graph is bicolorable if its nodes can be labelled using RED and BLUE in such a way that no RED node is adjacent a BLUE node.

$$\text{BICOLORABLE} = \{< G > \ | \ G \text{ is BICOLORABLE}\}$$

Describe a Turing machine that decides BIOCOLORABLE.