


Rosen, Discrete Mathematics and Its Applications, 6th edition
Extra Examples

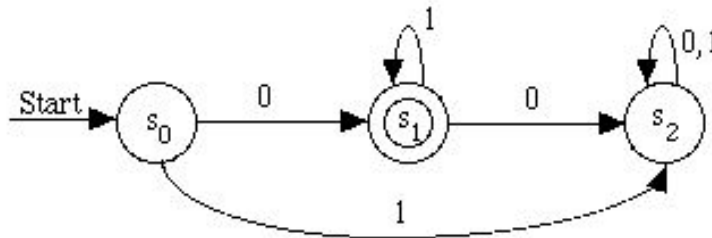
Section 12.3—Finite-State Machines with Output

 — Page references correspond to locations of Extra Examples icons in the textbook.

p.807, icon at Example 6

#1. Construct a deterministic finite-state automaton that recognizes the set of all bit strings such that the first bit is 0 and all remaining bits are 1's.

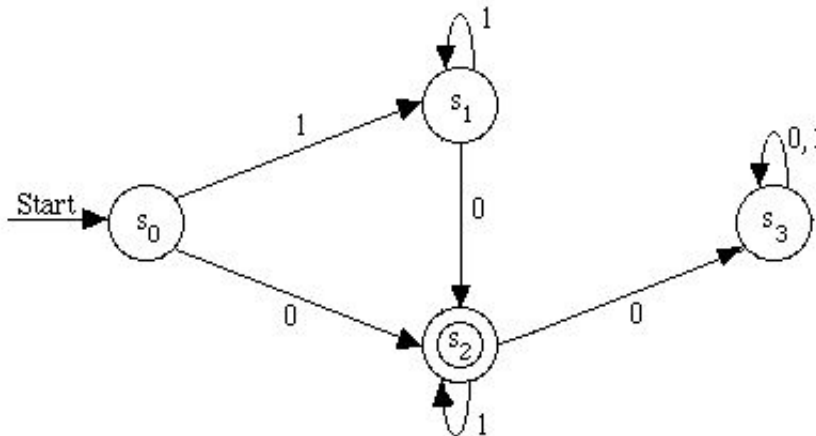
Solution:



p.807, icon at Example 6

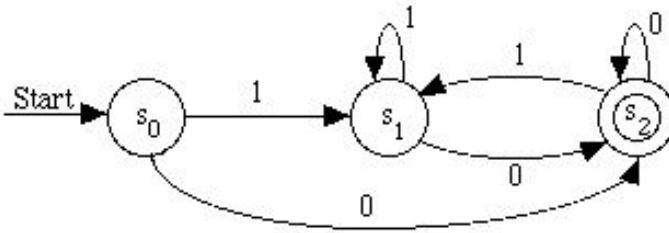
#2. Construct a deterministic finite-state automaton that recognizes the set of all bit strings that contain exactly one 0.

Solution:



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#3. Determine the set of bit strings recognized by the following deterministic finite-state automaton.

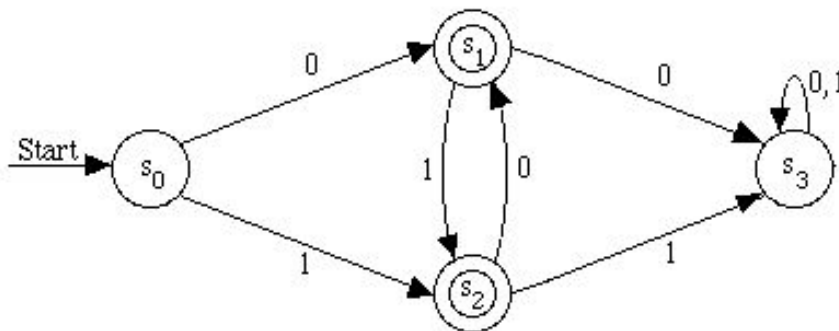


Solution:

If the bit string ends in 0, you end in state s_2 . If the bit string ends in 1, you end in state s_1 . Therefore, this automaton recognizes all bit strings that end in 0.

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#4. Determine the set of bit strings recognized by the following deterministic finite-state automaton.

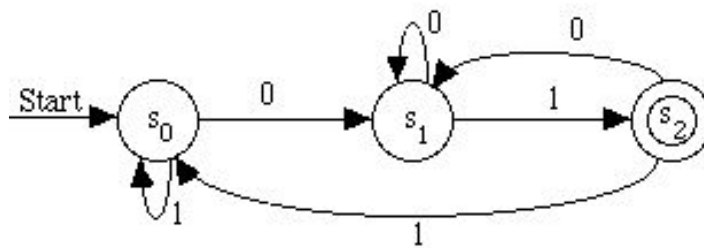


Solution:

If the bit string has two consecutive 0's or two consecutive 1's, you end in state s_3 . If the bit string has no two consecutive 0's or two consecutive 1's, you end in either state s_1 or s_2 . Therefore, this automaton recognizes all bit strings that alternate 0's and 1's.

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#5. Determine the set of bit strings recognized by the following deterministic finite-state automaton.



Solution:

The string must end in 01 in order to be recognized by this automaton. If the string ends in 11, the string ends in state s_0 . If the string ends in 0, the string ends in state s_1 .
