DISCRETE MATHEMATICS – CH6 Homework6

6.1

12. For $\Sigma = \{0,1\}$ determine whether the string 00010 is in each of the following languages (taken from Σ^*). (10 pts)

(a) {0, 1}* (b) {000, 101}{10, 11} (c) {00}{0}*{10}

(d) {000}*{1}*{0} (e) {00}*{10} (f) {0}*{1}*{0}*

a. yes
b. {00010, 00011, 10110, 10111} yes
c. {00010, 000010, ….} yes
d. {00010, 000000110,…} yes
e. {000010, 00000010…} no
f. {010, 0010, 00010,…..} yes

6.2

8. Let $M = (S, \mathcal{I}, \mathcal{O}, \nu, \omega)$ be a finite state machine with $\mathcal{I} = \mathcal{O} = \{0, 1\}$ and S, ν, and ω determined by the state diagram shown in Fig. 6.7.

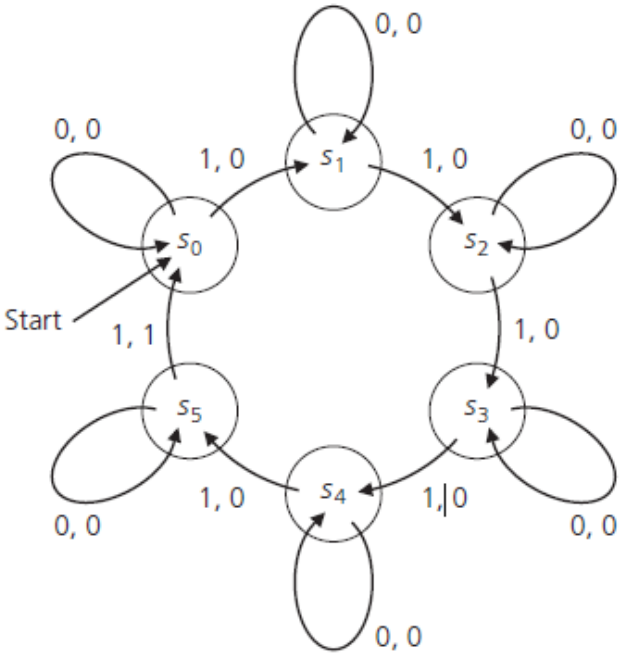


Figure 6.7

a) Find the output for the input string $x = 0110111011$.

b) Give the transition table for this finite state machine.

c) Starting in state s_0, if the output for an input string x is 0000001, determine all possibilities for x.

d) Describe in words what this finite state machine does. (10 pts)

a) output 0000000010

b)

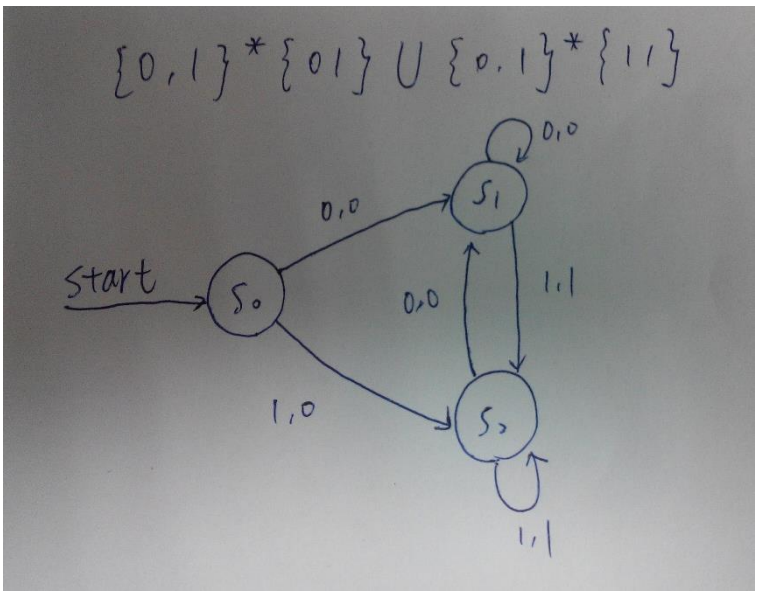
	υ		ω	
	0	1	0	1
S_0	S_0	S_1	0	0
S_1	S_1	S_2	0	0
S_2	S_2	S_3	0	0
S_3	S_3	S_4	0	0
S_4	S_4	S_5	0	0
S_5	S_5	S_0	0	1

c) $\omega(x, S_0) = 0000001$ for x=(1)1111101 ; (2)1111011 ; (3)1110111 ; (4)1101111; (5)1011111; and (6)0111111

d) The machine recognizes the occurrence of a sixth 1, a 12th 1, …… in an input x

Others

Construct a state diagram for a finite state machine with $I = O$={0, 1} that recognizes all strings in the language {0, 1}*{01} ∪ {0, 1}*{11} (10 pts)



Advanced assignment (20 pts)

Design a FSM with |S|=n, that can recognize m special patterns (pattern length=2)

• Give an example FSM that n<=4, m=2

• Try to find a FSM that n=m+1 when m>2

• What will happen when pattern length=3?