

Practice #34 p 6 20

State Table:

<u>current</u>	<u>Next State</u>		<u>out</u>
	<u>0</u>	<u>1</u>	
s_0	s_0	s_3	0
s_1	s_0	s_2	1
s_2	s_3	s_3	1
s_3	s_1	s_3	2

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Input	2	1	1	0	
State	s_0	s_1	s_0	s_1	s_1
Output	0	1	0	1	1

Building a finite state machine -

Binary adder

States:

s_{00} - write 0 carry 0

s_{01} - write 0 carry 1

s_{10} - write 1 carry 0

s_{11} - write 1 carry 1

Output
0

0

1

1

Input alphabet: $\{00, 01, 10, 11\}$

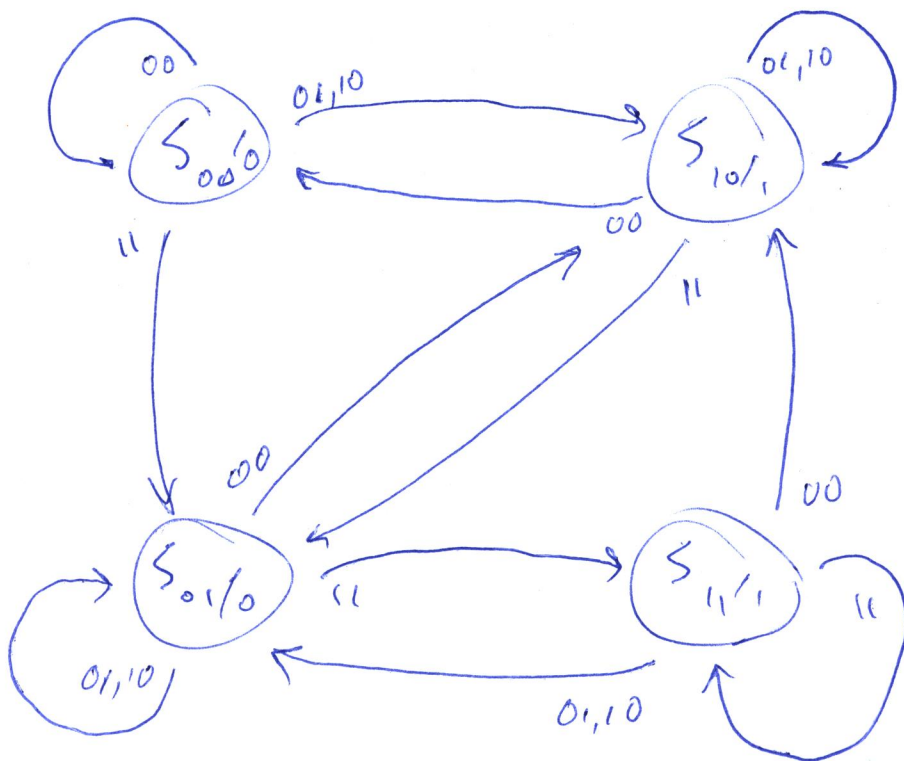
Output - $\{0, 1\}$ (what the machine writes)

Next State Function?

$$f(s_{00}, 00) = s_{00}$$

Present State	Next State				Output
	00	01	10	11	
S_{00}	S_{00}	S_{10}		S_{01}	0
S_{01}	S_{10}	S_{01}	J	S_{11}	0
S_{10}	S_{00}	S_{10}		S_{01}	1
S_{11}	S_{10}	S_{01}		S_{11}	1

As a graph :



forces on the carry digit

0	0	1	1
0	1	0	1
1	0	0	0

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Compute the sum

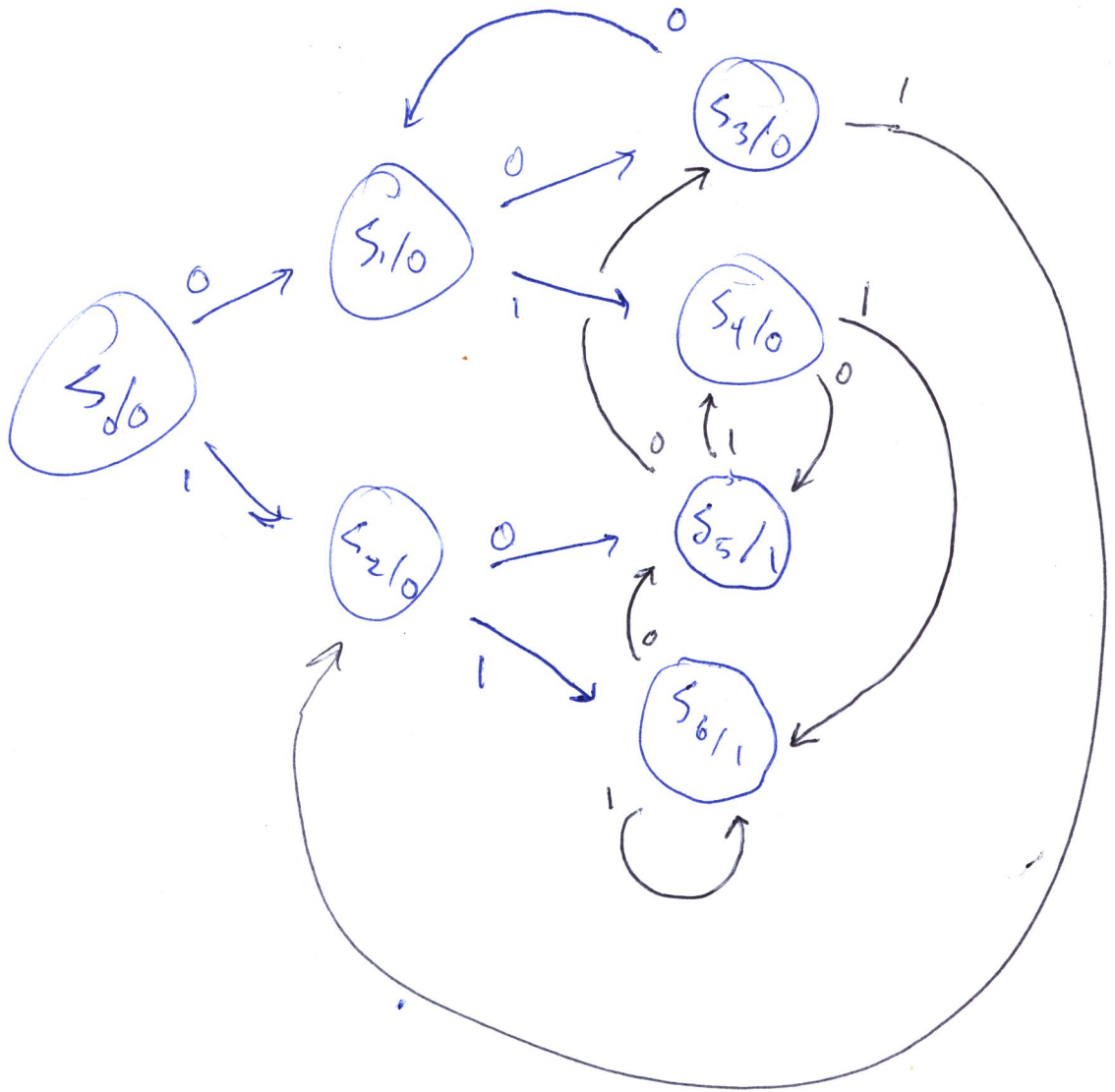
$$\begin{array}{cccccccc}
 & & & & & & & \\
 & & & & & & & \\
 0 & 1 & 1 & 1 & 0 & 1 & 1 & 0 \\
 & & & & & & & \\
 0 & 1 & 0 & 1 & 0 & 1 & 0 & 1 \\
 \hline
 1 & 0 & 1 & 0 & 1 & 0 & 1 & 1
 \end{array}$$

using the machine

Input	01	10	11	00	11	10	11	00
State	S_{00}	S_{10}	S_{10}	S_{01}	S_{10}	S_{01}	S_{00}	S_{10}
Output	0	1	1	0	1	0	0	1

So let's build another machine!

#15(a), p 638



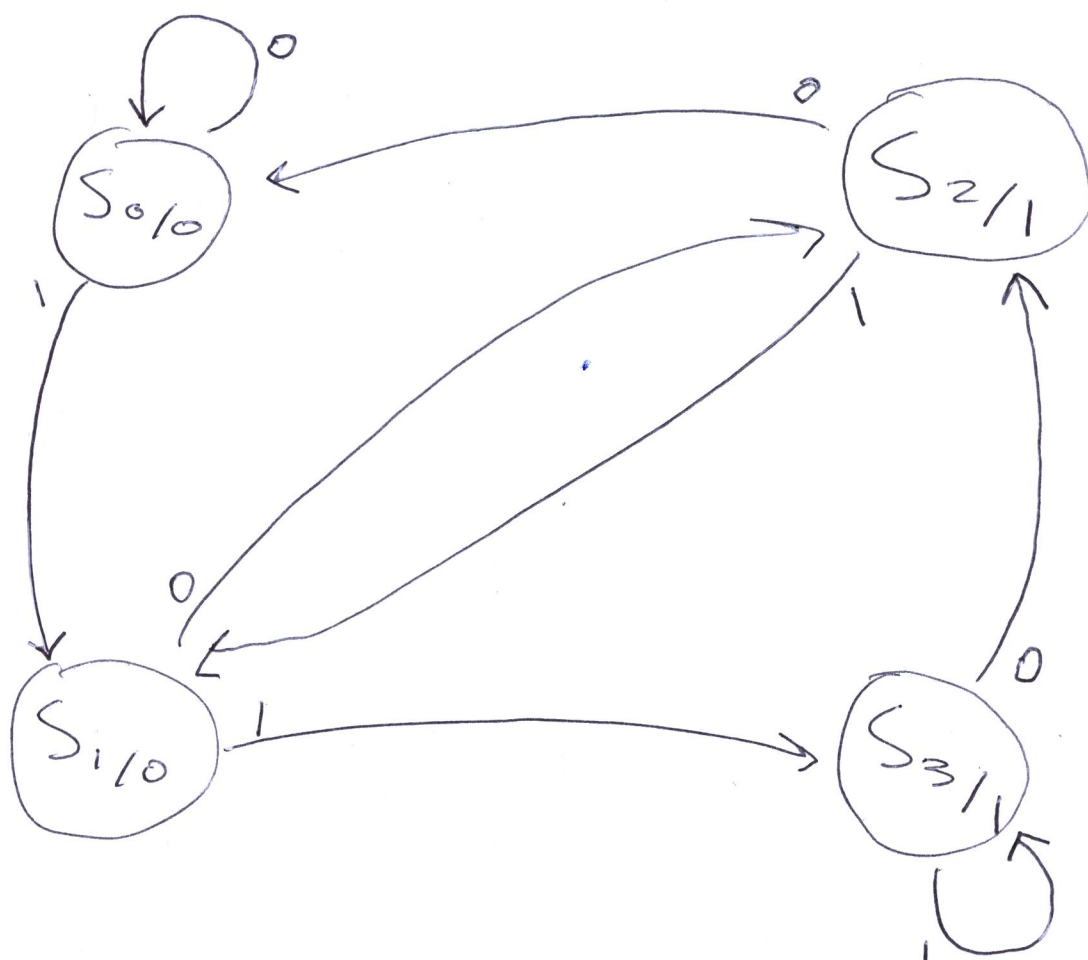
Input	0	1	1	0	0	0	1	x	
State	s_0	s_1	s_4	s_6	s_5	s_3	s_2	s_4	$\{s_5, s_6\}$
Output	0	0	0	1	1	0	0	0	1

S_0 - write zero, store zero

S_1 - write zero, store one

S_2 - write one, store zero

S_3 - write one, store one



Input	0	1	1	0	0	0	1	x	
State	S_0	S_0	S_1	S_3	S_2	S_0	S_0	S_1	$\{S_2, S_3\}$
Output	0	0	0	1	1	0	0	0	1

Practice 40

(a) Recognizes $S = \{0\}$

(b) " $S = \{10, 010, 0010, \dots\}$

(c) " $S = \{0, 1\}$

(d) " $S = \{\lambda, 11, 1111, 111111, \dots\}$

(b) Can be written better as a regular expression

$$0^*(10)$$

(d) $(11)^*$

#32 p641

$$S =$$

$$RE = (11)^* 0 1 (01)^* \text{ or } 11^*$$