In [3]:
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### CSCI-3080 Discrete Structure
### OLA 6: Chapter 9 -- Finite-Sate Machine & Turing Machines
###        Chapter X -- Binary Encoding Scheme
### Name:
### Student ID:
### Date:
### Total: 100 Points
```

1. Please draw the state graph for the following finate state machine, and compute the output sequence for the given input sequence. (16 points)

(For the output, please **ignore the first bit for the inital state**.)

(a) (**8 points**)

Input:0011

0011

Present state	Next state		Output
	Present input		
	0	1	
s_0	s_2	s_3	0
s_1	s_0	s_1	1
s_2	s_1	s_3	0
s_3	s_1	s_2	1

(**Please draw the time table how to get the output**)

In [ ]:

(b) (**8 points**)

Input:acbbca

acbbca

Present state	Next state			Output
	Present input			
	a	*b*	*c*	
s_0	s_1	s_1	s_1	0
s_1	s_2	s_2	s_1	0
s_2	s_0	s_2	s_1	1

(**Please draw the time table how to get the output**)

In [ ]:

2. Finite-State Machine (16 points)

(a) Please construct a finite-state machine that will compute the **bitwise OR** of two binary input string. (**8 points**)

(**Please draw the finite-state machine**)

In [ ]:

(b) Write the output for the input sequence consisting of the strings 11011 and 10010 (read left to right) (**8 points**)

(For the output, please **ignore the first bit for the initial state**.)

(**Please draw the time table how to get the output**)

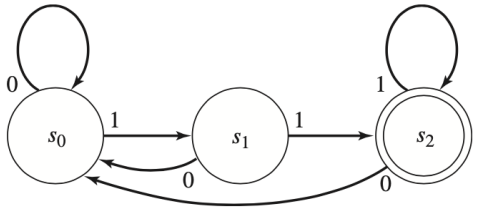
In [ ]:

3. Determine whether the given machine recognizes the given input string. (**16 points**)

(a) (**8 points**)

Input:01110111

01110111



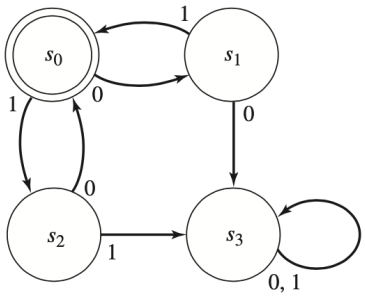
(**Please draw the time table how to get the output**)

In [ ]:

(b) (**8 points**)

Input:01101

01101

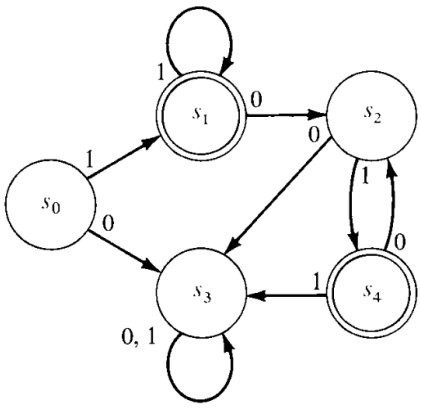


(**Please draw the time table how to get the output**)

In [ ]:

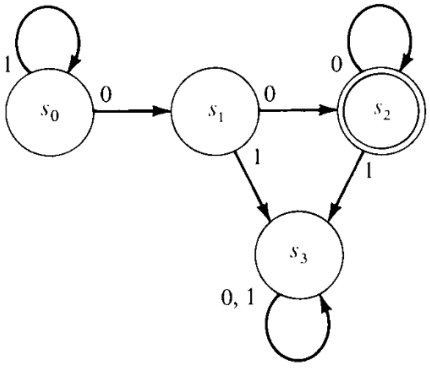
4. Please give a regular expression for the set recognized by the following finite-state machine. (**10 points**)

(a) (**5 points**)



In [ ]:

(b) (**5 points**)



In [ ]:

5. Consider the Turing Machine (**10 points**)

(0, 1, 1, 0, R)
(0, 0, 0, 1, R)
(1, 1, 1, 1, R)
(1, b, 1, 2, L)
(2, 1, 1, 2, L)
(2, 0, 0, 2, L)
(2, b, 1, 0, R)

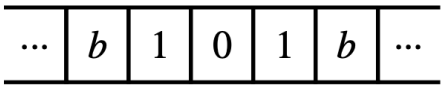
(a). What is its behavior when started on the tape (**5 points**)

...	b	1	0	1	0	b	...

(**Please draw all the steps**)

In [ ]:

(b). What is its behavior when started on the tape (**5 points**)



(**Please show all the steps**)

In [ ]:

6. Please draw the relationship diagram for P, NP, NP-Complete and NP-Hard problems. (**5 points**)

In [ ]:

7. The following hamming code word was received. Use it to answer questions (1) - (5). (**27 points**)

0000110

(1) What position number is generated to determine if an error has ocurred in transmission? (**10 points**)

In [ ]:

(2)Did an error occur? (**2 points**)

In [ ]:

(3) What was the transmitted code word? (correct code) (**5 points**)

In [ ]:

(4) What was the transmitted message? (correct message) (**5 points**)

In [ ]:

(5) If the message was binary, what was the decimal value of the correct message? (**5 points**)

In [ ]: