

Date: Monday, March 26

Offering: Winter 2019

This assignment is due at the beginning of class, Monday, April 1. If you have any questions, please see the instructor or the teaching assistant for clarification. Answer all questions in the spaces provided. Remember to *neatly print your name* along with your *student ID* below. Loose (i.e., unstapled) sheets will not be accepted. Thank you!

Name: _____ Student ID: _____

Question	Mark
1 (8)	
2 (8)	
3 (8)	
Total (24)	

1. **(Self-Correcting Circuits)** Construct a counter with JK flip-flops that goes through the following binary repeated sequence: 0, 1, 2, 3, 4, 5, 6. Following the procedure given in class, show that when binary state 111 is considered as a don't-care condition, the counter operates properly.
 - a. Determine the state-transition table

b. Show the work required to find the minimized flip-flop input equations

c. Show the unused state computation, and next-state diagram. Is the circuit self-correcting?

2. (State Reduction) Consider the state table below.

Present State	NEXT STATE		OUTPUT	
	X=0	X=1	X=0	X=1
A	F	B	0	0
B	D	C	0	0
C	F	E	0	0
D	G	A	1	0
E	D	C	0	0
F	F	B	1	1
G	G	H	0	1
H	G	A	1	0

- a. Starting from state A and the input sequence 01110010011, determine the output sequence for the state table above.

STATE:

INPUT: 0 1 1 1 0 0 1 0 0 1 1

OUTPUT:

- b. Use the *row* method to reduce the number of states in the state table above. Remember to draw the new (reduced) state table.

- c. Apply the same input sequence from part (a) to the minimized state machine in part (b) and show that the same output sequence is obtained for both the original and reduced state machines.

STATE:

INPUT: 0 1 1 1 0 0 1 0 0 1 1

OUTPUT:

3. **(State Reduction)** Find a minimized state table for the synchronous sequential circuit below using the *implication* table provided below.

Present State	X	
	0	1
A	A/0	C/0
B	D/1	A/0
C	F/0	F/0
D	E/1	B/0
E	G/1	G/0
F	C/0	C/0
G	B/1	H/0
H	H/0	C/0

