Name: UID:

University of California Los Angeles Computer Science Department

CSM51A Midterm 2

Winter Quarter 2019

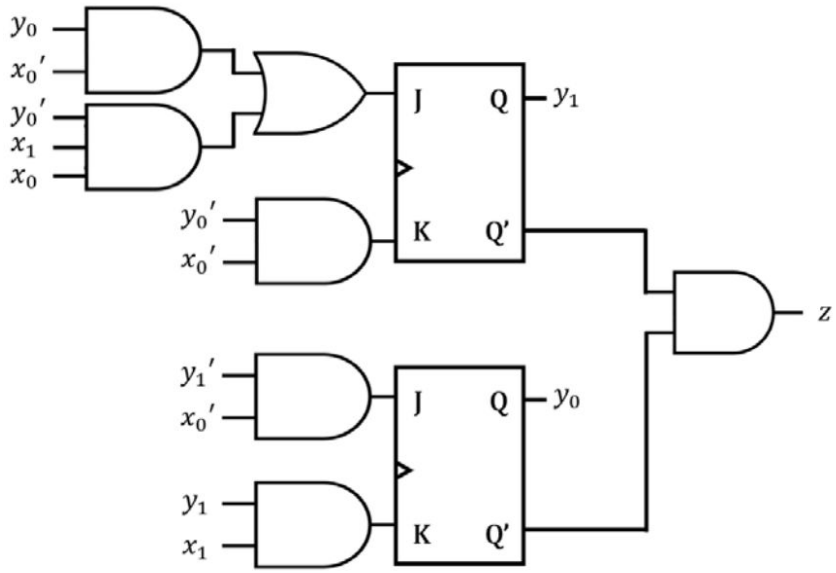
This is a closed book exam. Absolutely nothing is permitted except pen, pencil and eraser to write your solutions. Any academic dishonesty will be prosecuted to the full extent permissible by university regulations.

Time Allowed: 100 Minutes

Problem(Possible Points)	Points
1 (20)	
2 (20)	
3 (20)	
4 (20)	
5 (20)	
Total (100)	

Problem 1 (20 points)

Obtain a high level description (state transition table) of the network shown in the figure below. The system has two input bits x1 and x0 with output bit z.



Problem 1 Extra Page

Problem 2 (20 points)

Design a state transition table such that it initially has 8 states, and after minimization, reduces down to 3 states.

Problem 2 Extra Page

Problem 3 (20 points)

Given two 1-bit input streams A and B, output 1 if the difference between the number of times the pattern “001” appears in stream A and “101” appears in stream B is 3. If the difference between the number of their appearances is not 3, then the output is 0. The difference is at most 3. You may use any type of flip flops or logical gates of your choosing.

For example:

A: 001000000
B: 101010101

Would output: 000000001. Notice that the B pattern overlaps.

Problem 3 Extra Page

Problem 4 (20 points)

Using **OK flip-flops** as designed below and **multiplexers** for logic, design a **minimum** system which has the following behaviors:
Input set: {a, b, c}
Output: 1 if x(t-n, t) = a[b|c]+d*a
0 otherwise
Notes:
Overlaps can occur. For example ababa would output 00101
| means OR
* means 0 or more of the previous character
+ means 1 or more of the previous character

Prev State Q(t)	OK			
	00	**01**	**10**	**11**
0	1	1	0	-
1	-	1	0	0
	Nxt State Q(t+1)			

Problem 4 Extra Page

Problem 5 (20 points)

Given 6 2-bit numbers as input, {A, B, C, D, E, F}, design a system such that the system finds the maximum sum between any of the 2 inputs. You may only use multiplexers to implement this system.

For example, if all the inputs are 01, then the maximum sum output should be 010.

Problem 5 Extra Page