University of California, San Diego

M.S. Exam: Logic Design

Fall 2012

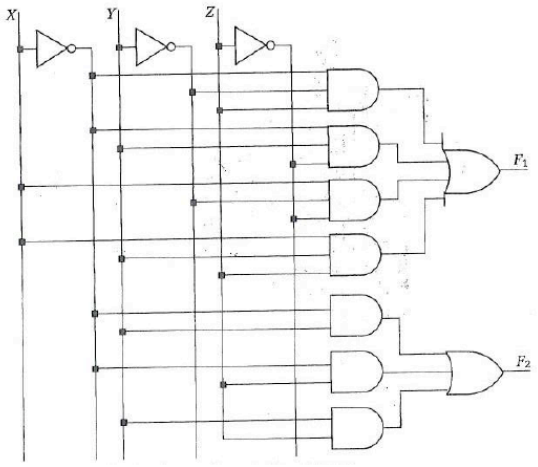
Name: _____ PID: _____

Instructions:

- *In taking this examination, you agree that all work recorded herein is your own. A student caught in the act of cheating will be given a grade F on this exam.*
- *All work to be done on the attached sheets. Write your name at the top of every sheet.*

Problem	Points	Score
1	25	
2	20	
3	20	
4	25	
Total	**90**	

Problem 1. Consider the following circuit:



(a) Fill the truth table. (Hint some of the cells are filled) **(5 points)**

X	Y	z	F_1	F_2
0	0	0	0	
0	0	1		
0	1	0		1
0	1	1		1
1	0	0		
1	0	1		
1	1	0		
1	1	1		

(b) Write down F_1 and F_2 in canonical sum of products form. **(5 points)**

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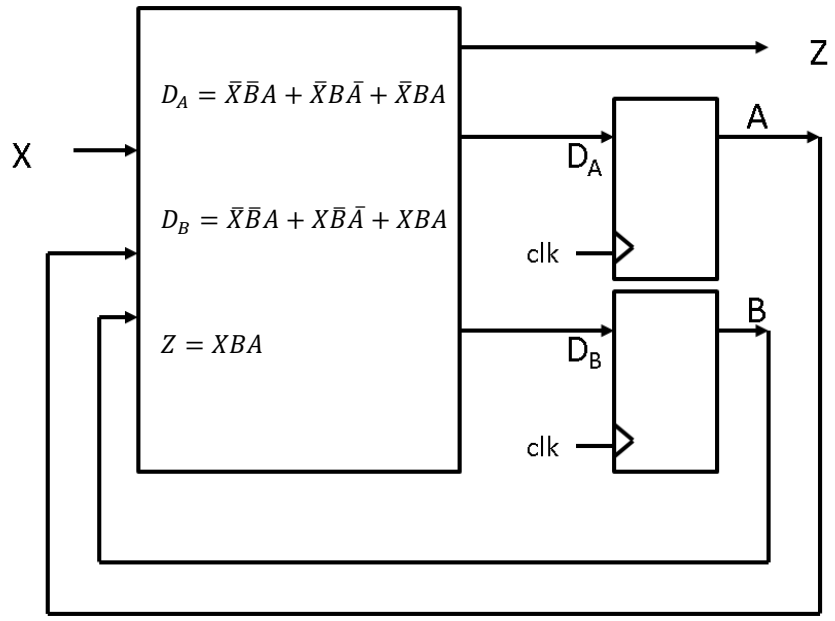
(c) Draw K-Map for the outputs. **(10 points)**

(c) Write down the Boolean expressions for the minimized sum-of-products form of each function.

(5 points)

Name: _____

Problem 2. A sequential circuit with two D flip-flops A and B, one input X, and one output Z is given as follows:



(a) Derive the state transition table. **(10 points)**

Name: _____

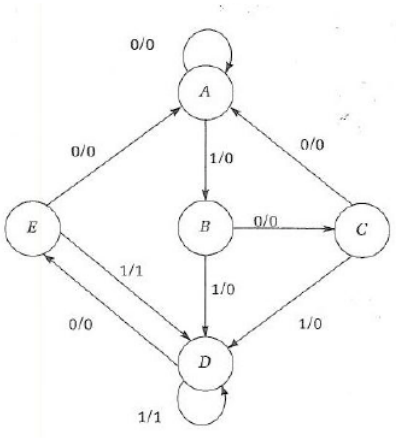
(b) Derive the state diagram. **(10 points)**

Name: _____

Problem 3. A finite state machine has one input and one output. The output becomes one and remains one thereafter when at least one zero and two ones have occurred as inputs, regardless of the order of occurrence. Assuming this is to be implemented as Moore machine, draw the state diagram for the machine. **(20 points)**

Name: _____

Problem 4. Consider the following state machine:



Considering state assignments as: A:000, B:001, C:101, D:011, E:010

(a) Derive state transition table. **(10 points)**

Name: _____

(b) Find the circuit using D flip-flops. **(15 points)**