Practice problems

CSE 370 Quiz section
04/25/2000

Warm up

Fast K-Maps. Emphasis on FAST!

CD \ AB	00	01	11	10
00	0	0	1	1
01	0	1	1	X
11	X	0	0	0
10	X	0	1	1

CD \ AB	00	01	11	10
00	1	X	1	X
01	0	X	0	X
11	1	1	1	0
10	0	1	0	1

CD \ AB	00	01	11	10
00	1	0	1	0
01	0	1	0	1
11	1	0	1	0
10	0	1	0	1

CD \ AB	00	01	11	10
00	1	0	0	0
01	1	0	X	1
11	X	1	1	0
10	0	0	0	0

Problem 1

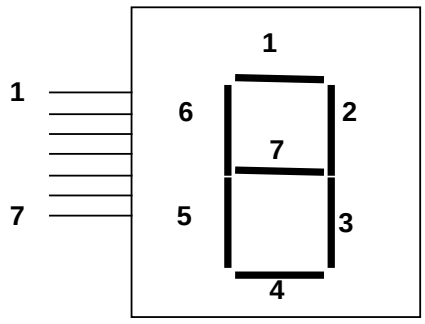
The very well known Snorkel function is defined as follows:

Snorkel(A, B, C, D) = A'BCD + ABC'D + AC

a) Implement the Snorkel function using a 16:1 mux. Also implement your 16:1 mux using 2:1 muxes.
b) Implement the Snorkel function using one 8:1 mux and gates, with A, B and C as inputs to the mux
c) Implement the Snorkel function using one 4:1 mux and gates, with A and B as inputs to the mux
d) Implement the Snorkel function using a 3:8 demux and an OR gate.
e) Design a circuit for the Snorkel function using just gates and a K-map.
f) Which of the above do you think has the least number of gates? The most? Which do you think has the least propagation delay? The most?

Problem 2

You have to design the graphical display for an elevator. The elevator control system, already designed by Microsoft (which has now gone into the hardware market) will give you a 4-bit number which will represent the state that the elevator is in. You have to use a 7-segment display, as shown below, to display information about the elevator. The seven-segment display has 7 inputs, one for each segment. When a given input is 1, the associated segment is turned on, when it's 0, the associated segment is turned off.



The states that the elevator can be in are sequentially numbered from 0 up to 10, and are: Up, Down, Burning (in case the users haven't noticed that the elevator is burning…), 0 (floor 0…), 1 (1st floor), 2, 3, 4, 5, 6, 7.

Design a block that will use the 4 bit state given by the elevator controller to generate the inputs to the seven segment display (Represent Up as 'U', Down as 'd', Burning as 'b', and the floor numbers as a digit).