Assignment 2

1. Consider the two Boolean functions

$$F_1(A, B, C, D) = (0, 1, 4, 5, 8, 9, 10, 12, 13)$$
$$F_2(A, B, C, D) = (3, 5, 7, 8, 10, 11, 13, 15)$$

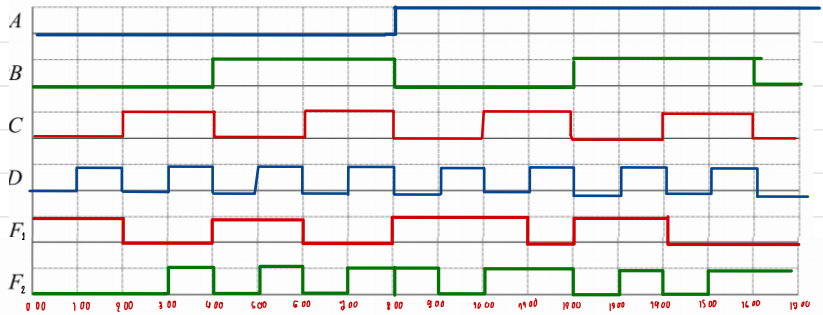
Simplify these functions by means of maps. Obtain a composite logic diagram with four inputs, A, B, C, and D, and two outputs, F_1 and F_2. Implement the two functions together, using a minimum number of NAND gates. Build and simulate the circuits it Proteus. Connect the circuit to the binary counter (similar to Figure 8) to obtain the waveforms. Sketch the waveforms.

2. Plot the following Boolean function in a map:

$$F = A'D + BD + B'C + AB'D$$

Combine the 1's in the map to obtain the simplified function for F in sum-of-products form. Then combine the 0's in the map to obtain the simplified function for F', also in sum-of-products form. Implement both F and F' with NAND gates, and connect the two circuits to the same input switches, but to separate output indicator lamps. Obtain the truth table of each circuit in the simulation and show that they are the complements of each other.

(1)



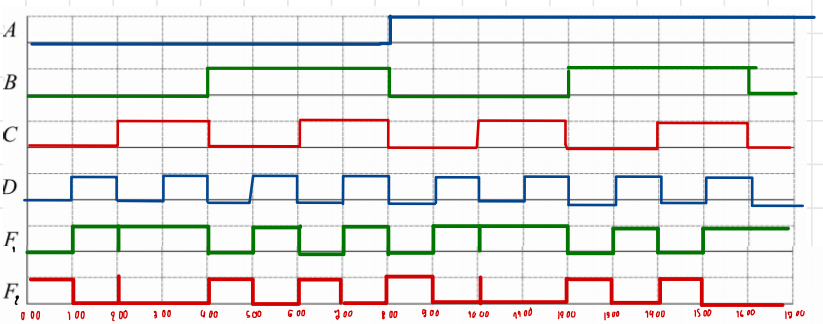
2. Plot the following Boolean function in a map:

$$F = A'D + BD + B'C + AB'D$$

(2)

A	B	C	D	F
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1

A	B	C	D	F
1	0	0	0	1
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0



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