Homework #1 Due September 5, 2007

2.6 Use Venn diagram to prove that

$$(x_1 + x_2 + x_3)\bullet(x_1 + x_2 + \overline{x_3}) = x_1 + x_2$$

2.8 Draw a timing diagram for the circuit in Fig. 2.19a. Show the waveforms that can be observed on all wires in the circuit.

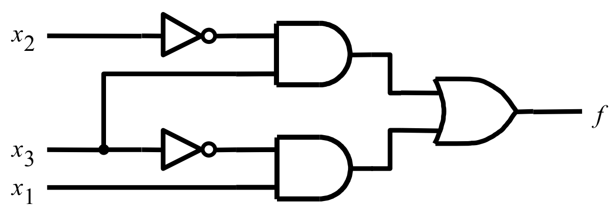

Fig. 2.19(a) A minimal sum-of-products realization

2.11 Use algebraic manipulation to show that the three input variables x_1, x_2, and x_3

$$\prod M(0,1,2,3,4,5,6) = x_1x_2x_3$$

2.12 Use algebraic manipulation to find the minimum sum-of-products expression for the function $f = x_1x_3 + x_1\overline{x_2} + \overline{x_1}x_2x_3 + \overline{x_1}\,\overline{x_2}\,\overline{x_3}$

2.21 Design the simplest sum-of-products circuit that implements the function $f(x_1, x_2, x_3) = \sum m(1,3,4,6,7)$.

2.29 Design the simplest circuit that has 3 inputs, x_1, x_2, x_3, which produces an output value of 1 whenever exactly one or two of the input variables have the value 1; otherwise, the output has to be 0.

2.34 For the timing diagram in Fig. P2.4, synthesize the function $f(x_1,x_2,x_3)$ in the simplest POS form.

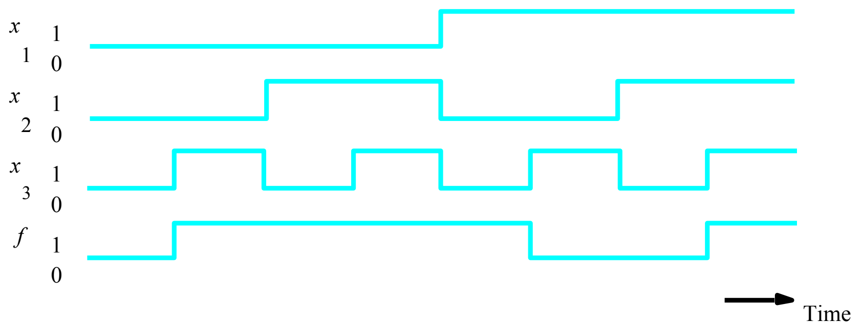

Fig. P2.4. A timing diagram representing a logic function.

2.38 Implement the function in Fig. 2.26 using only NOR gates.

x_1	x_2	x_3	f
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Fig. 2.26. Truth table for a three-way light control.