Digital Circuits: Homeworks #3

Due on Thursday, April 27, 2017

Note: Late homework is not accepted. Good luck.

1. **Logic Circuit.**
   Implement a logic circuit for the following truth table.

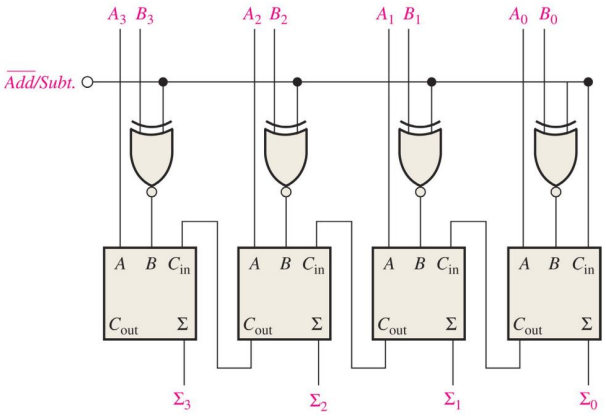
A	B	C	X
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

2. **Adder and Subtracter.**
   The circuit shown in Figure 1 is a 4-bit circuit that can add or subtract numbers in a form used in computers (positive numbers in true form; negative numbers in 1's complement form).

   (a) Explain what happens when the $\overline{Add}/Subt$ input is HIGH?

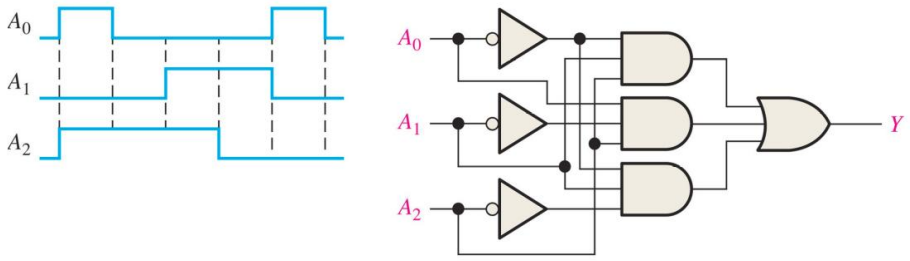
   (b) Explain what happens when the $\overline{Add}/Subt$ input is LOW?

Figure 1: Adder and Subtracter.



3. **Decoder.**
   If the input waveforms are applied to the decoding logic as indicated in Figure 2, sketch the output waveform in proper relation to the inputs.

Figure 2: Decoder.



4. **Multiplexer.**
   For the multiplexer in Figure 3, input states are given by $D_0 = 1, D_1 = 0, D_2 = 0, D_3 = 1$. Then, determine the output waveform when the data-select inputs are sequenced as shown by the waveforms in Figure 4.

Figure 3: Multiplexer.

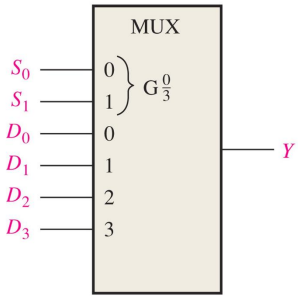


Figure 4: Data-Select Input Waveforms.