

Union College

ECE318

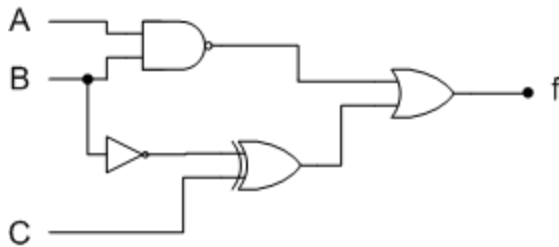
Assignment 1

Due Date: Thursday January 17th at 10:30 a.m.

1. Read Chapters 1 and 2 in the Zwolinski textbook.
2. Zwolinski, Exercise 2.1
3. Zwolsinki, Exercise 2.2
4. Assume the following gate delays for the circuits in Zwolinski text Figure 2.19
 - AND, OR: 150ps,
 - NAND, NOR: 100ps,
 - NOT: 250ps

What is the **maximum** combinational delay in each circuit?

5. Fill out a truth table for the following circuit:



6. Find the minimum logic expressions for F and G:

F:

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

G:

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

7. Let “m” denote a minterm as usual and “D” denote “Don’t care” cases. Find the minimum implementation of the following function:

$$f(x_1, x_2, x_3, x_4) = \sum m(0,4,11,13,15) + D(2,3,5,10)$$

Is your implementation hazard free? If not, design and draw a circuit which is hazard free.

8. What steps of the digital design process are automated, and what steps are done by designers?

9. Calculate the noise margins given the following figures

$$V_{IH_{min}} = 4V, V_{IL_{max}} = 0.5V, V_{OH_{min}} = 4.5V, V_{OL_{max}} = 0.3V, V_{DD} = 5V$$

10. Find a representation for the decimal number -56.95 using the following number codes:

- binary fixed 16 point using signed-magnitude and assuming 8 bits are used for the integer value and 8 bits for the fraction
- binary fixed 16 point using 2's complement and assuming 8 bits are used for the integer value and 8 bits for the fraction
- binary floating point (single-precision, i.e., 32 bits)

11. Find which ASCII characters the following words represent (you can easily find an ASCII chart online). Assuming that we want even parity, what parity bit would be used in each case:

(i) 0010101

(ii) 1011101

(iii) 0111000