

ENEL 353 Tutorial T02

Tue Oct 1 2019

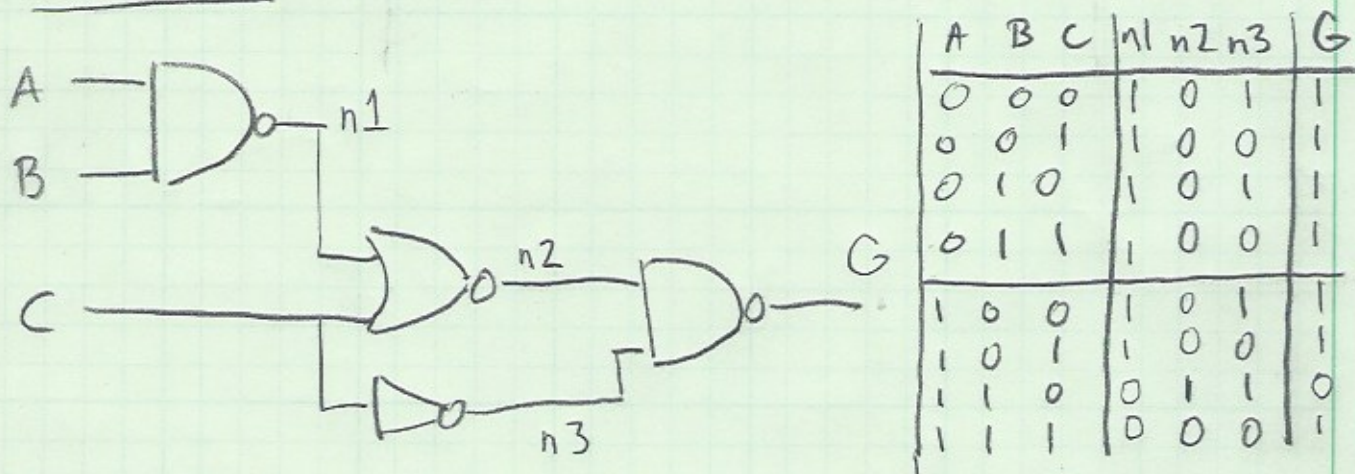
Page 1 of 3

Quiz #2: Tue Oct 8.

Exercise 1

A	B	C	\bar{A}	\bar{B}	AB	$\bar{A}\bar{B}$	$A\bar{B}C$	F
0	0	0	1	1	0	1	0	1
0	0	1	1	1	0	1	0	1
0	1	0	1	0	0	0	0	0
0	1	1	1	0	0	0	0	0
1	0	0	0	1	0	0	0	0
1	0	1	0	1	0	0	1	1
1	1	0	0	0	1	0	0	1
1	1	1	0	0	1	0	0	1

Exercise 2



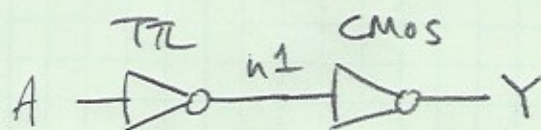
Canonical SOP: Will have 7 minterms - one for each row with $G=1$

Canonical POS: Will have 1 maxterm - one for each row with $G=0$.

For this example, POS canonical form is simpler.

Exercise 3

Buffer (1)



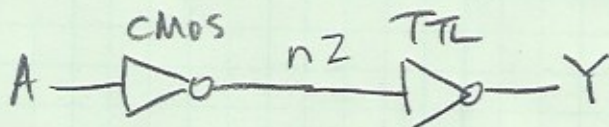
Let's check cases of logic 0 at A, and logic 1 at A.

logic 0 at A

Voltage at n1 is in the range from 2.4V to 5.0V. For reliable 1 input to CMOS, voltage must be $\geq 3.15V$. Design is not reliable.

logic 1 at A - no need to check this.

Buffer (2)



logic 0 at A $V_{n2} \geq 3.84V$ TTL needs only 2.0V
This is fine

logic 1 at A $V_{n2} \leq 0.33V$ TTL needs a max. of 0.8V
This is also fine

Conclusion: Buffer (2) is a reliable design.

Exercise 4

<u>expression</u>	<u>SOP?</u>	<u>SOP canonical?</u>	<u>POS?</u>	<u>POS canonical?</u>
1	YES	NO	YES	YES
2	YES	YES	YES	NO
3	YES	NO	NO	NO
4	NO	NO	YES	YES
5	YES	YES	NO	NO
6	NO	NO	NO	NO

ENEL 353
Tutorial T02
Oct 1 2019
2 of 3

Exercise 5

row	A	B	C	true minterms	false maxterms	F
0	0	0	0	$\bar{A}\bar{B}\bar{C}$		1
1	0	0	1	$\bar{A}\bar{B}C$		1
2	0	1	0	$\bar{A}B\bar{C}$		1
3	0	1	1		$A + \bar{B} + \bar{C}$	0
4	1	0	0	$A\bar{B}\bar{C}$		1
5	1	0	1		$\bar{A} + B + \bar{C}$	0
6	1	1	0		$\bar{A} + \bar{B} + C$	0
7	1	1	1	ABC		1

ENEL 353
Tutorial T02
Oct 1 2019
3 of 3

SOP canonical form

$$F = \bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC$$
$$= \sum(m_0, m_1, m_2, m_4, m_7)$$

POS canonical form

$$F = (A + \bar{B} + \bar{C})(\bar{A} + B + \bar{C})(\bar{A} + \bar{B} + C)$$
$$= \prod(M_3, M_5, M_6)$$

Exercise 6 - Solution will be posted