elec 2607: Assignment # 1

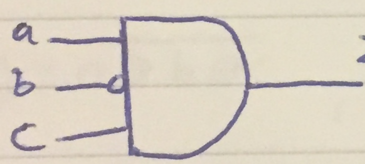
1.

d	b	a	$d+b+a$	$\overline{d+b+a}$	$\overline{(d+b)}$	$\bar{a}$	$\overline{(d+b)} \cdot \bar{a}$
1	1	1	1	0	0	0	0
1	1	0	1	0	0	1	0
1	0	1	1	0	0	0	0
1	0	0	1	0	0	1	0
0	1	1	1	0	0	0	0
0	1	0	1	0	0	1	0
0	0	1	1	0	1	0	0
0	0	0	0	1	1	1	1

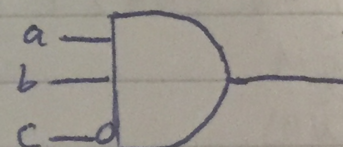
- Therefore $\overline{d+b+a}$ is equal to $\overline{(d+b)} \cdot \bar{a}$

2.

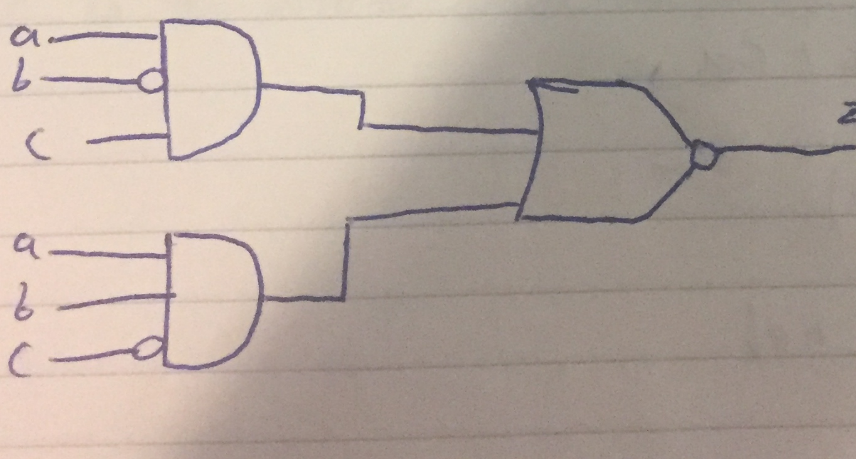
a)



b)



c)



3.

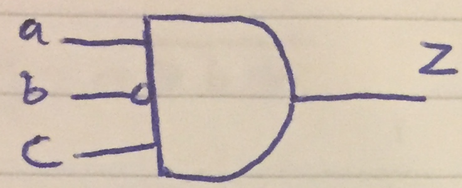
a) $(A + B + \bar{B}C)(B + A)(B + \bar{A})$

0 0 0 0 0 1 1 1 0 1 0 0 1

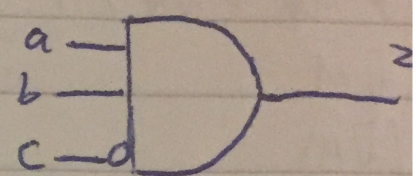
– Therefore $\overline{d+b+a}$ is equal to $\overline{(d+b)} \cdot \bar{a}$

2.

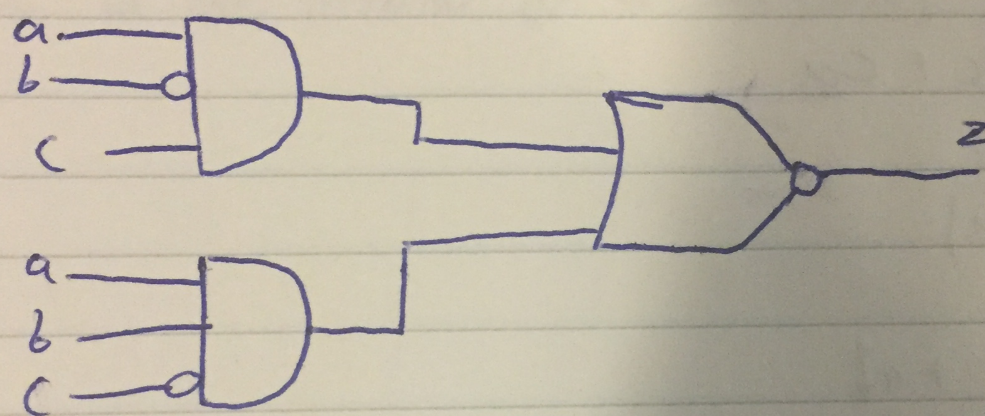
a)



b)



c)



3.

a) $(A + B + \bar{B}C)(B + A)(B + \bar{A})$

$(A + B + \bar{B}C)(BB + B\bar{A} + AB + A\bar{A})$

$(A + B + \bar{B}C)(A + B)$

$(A + B + \bar{B}C)(B)$

$AB + BB + \bar{B}BC$

$AB + B = B$

b) $(xyz + y)\, yz$

$xyzyz + yyz$

$xyz + yz$

$= yz(x+1)$

$= yz$

c) $L\bar{M} + LN + \bar{N}M$

$L(\bar{M} + N) + \bar{N}M$

$L\bar{M}N + L\bar{M}\bar{N} + LMN + L\bar{M}N + LNM + \bar{L}\cdot\bar{N}M$

$L(\bar{M}N + \bar{M}\bar{N} + MN + N\bar{N}) + \bar{L}\cdot\bar{N}M$

$L + \bar{L}\bar{N}M$

$L + \bar{L}(\bar{N}M)$

$= L + \bar{N}M$

4. $(a+b)(b+c)(c+a) = ab + bc + ca$

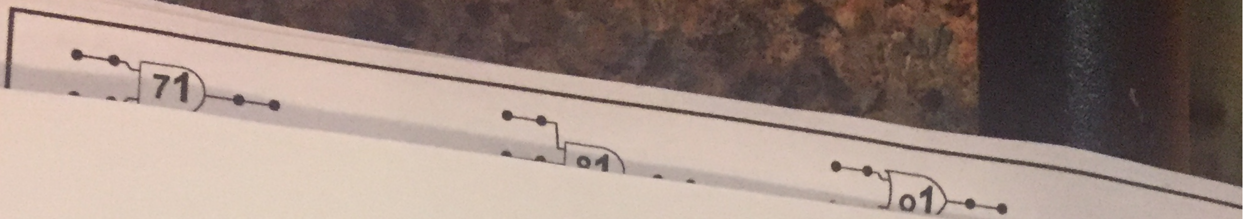
$LHS = (a+b)(b+c)(c+a)$

$= (ab + ac + b + bc)(c+a)$

$= (ac + b)(c+a)$

$= ac\cdot c + bc + ac\cdot a + ab$

$= ac + bc + ab$



5. $\bar{a}\bar{b} + ab = (a+\bar{b})(\bar{a}+b)$

using duality $(\bar{a}+\bar{b})(a+b) = a\bar{b} + \bar{a}b$

$\Rightarrow$ $\bar{a}b + a\bar{b}$ can be written as $(\bar{a}+\bar{b})(a+b)$

6. $\overline{a(b\bar{c}+de)+\overline{(d+a)}cg} = F$

dual of $F = \{a+(b+\bar{c})(d+e)\}\cdot\{\overline{da}+(c+g)\}$

$= \{a+(b+\bar{c})(d+e)\}\cdot\{(\bar{d}+\bar{a})+(c+g)\}$

$= \{\bar{a}+(\bar{b}+c)(\bar{d}+\bar{e})\}\{(d+a)+(\bar{c}+\bar{g})\}$

7. $y = \overline{a \oplus b \oplus c}$ $\quad z = \overline{ab+bc+ca}$

y implements an even parity gate

z is the inverse of a magarity gate