EE10a HW1

Wednesday, January 11, 2023 12:13 AM

1) Prove the adsorption theorem: $A\cdot(\overline{A}+B)=A\cdot B$

$A+(\overline{A}\cdot B)=A+B$

$A\cdot(\overline{A}+B)$	Given	$A+(\overline{A}\cdot B)$
$=(A\cdot\overline{A})+(A\cdot B)$	Distributivity	$=(A+\overline{A})\cdot(A+B)$
$=0+A\cdot B$	Complement	$=1\cdot(A+B)$
$=A\cdot B$	Identity	$=A+B$

2)

0	0000	x
1	0001	x
2	0010	
3	0011	
4	0100	
5	0101	
6	0110	
7	0111	
8	1000	
9	1001	
10	1010	
11	1011	
12	1100	
13	1101	x
14	1110	x
15	1111	x

Win

Lose

Lose MAP

D_1D_0 \ D_3D_2	00	01	11	10
00	X	0	1	0
01	X	0	X	0
11	1	0	X	0
10	1	0	X	0

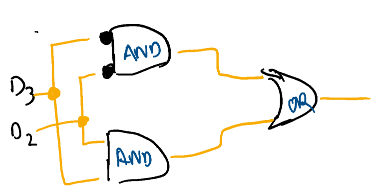
Win Map

D_1D_0 \ D_3D_2	00	01	11	10
00	X	0	0	0
01	X	0	X	
11	0	1	X	1
10	0	0	X	0

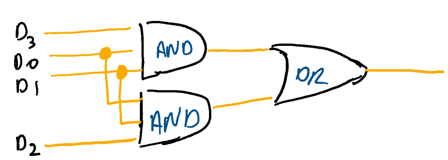
$\boxed{\text{Lose Eq: } \overline{D_3}\,\overline{D_2}+D_3D_2 \text{ (SoP)}}$

$\boxed{\text{Win Eq: } D_1D_0D_3+D_1D_0D_2 \text{ (SoP)}}$

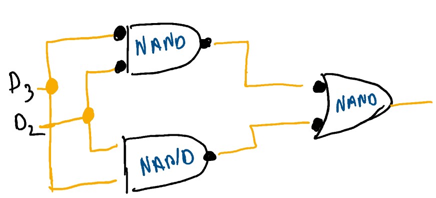
Lose AND/OR LOGIC



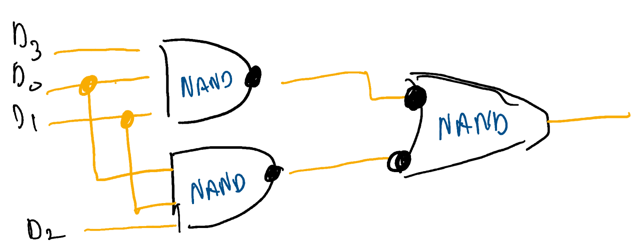
Win AND/OR LOGIC



Lose Logic NAND/NAND



Win NAND/NAND Logic



Lose logic PoS form:

$\overline{D_3}\,\overline{D_2}+D_3D_2=(D_3D_2+\overline{D_3})(D_3D_2+\overline{D_2})$

$=(\underbrace{\cancel{(D_3+\overline{D_3})}}_{1}(D_2+\overline{D_3}))((D_3+\overline{D_2})\underbrace{\cancel{(D_2+\overline{D_2})}}_{1})$

$=\boxed{(D_2+\overline{D_3})(D_3+\overline{D_2})}$

Lose MAP (False)

Win Logic PoS form:

$D_1D_0D_3+D_1D_0D_2=(D_1D_0D_3+D_1D_0)(D_1D_0D_3+D_2)$

$(D_1D_0D_3+D_1)(D_1D_0D_3+D_0)$

$[(D_1+D_1)(D_1+D_0)(D_1+D_3)][(D_0+D_0)(D_1+D_0)(D_3+D_0)]$

$[(D_1)(D_1+D_0)(D_1+D_3)][(D_0)(\cancel{D_1}+D_0)(D_3+D_0)][(D_2+D_3)(D_2+D_1)(D_2+D_0)]$

$[(D_2+D_3)(D_2+D_1D_0)]$

$[(D_2+D_3)(D_2+D_1)(D_2+D_0)]$

$=\boxed{D_0D_1(D_1+D_0)(D_1+D_3)(D_0+D_3)(D_2+D_0)(D_2+D_1)(D_2+D_3)}$

$(D_2+D_3)(D_3+D_2)$

$= D_0 D_1 (D_1+D_0)(D_1+D_3)(D_0+D_3)(D_2+D_0)(D_2+D_1)(D_2+D_3)$

Lose MAP (False)

D_1D_0 \ D_3D_2	00	01	11	10
00	X	0	1	0
01	X	0	X	0
11	1	0	X	0
10	1	0	X	0

$F = \overline{D_3}D_2 + D_3\overline{D_2}$

$\overline{F} = \overline{\overline{D_3}D_2 + D_3\overline{D_2}}$

$\overline{F} = (\overline{\overline{D_3}D_2})(\overline{D_3\overline{D_2}})$

$\overline{F} = \boxed{(D_3+\overline{D_2})(\overline{D_3}+D_2)}$

Win MAP (False)

D_1D_0 \ D_3D_2	00	01	11	10
00	X	0	0	0
01	X	0	X	0
11	0	1	X	1
10	0	0	X	0

$\overline{A+B} = \overline{A}\,\overline{B}$

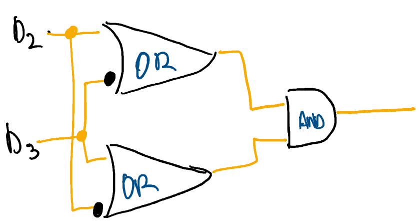
$F = \overline{D_1} + \overline{D_3}\,\overline{D_2} + D_1\overline{D_0}$

$\overline{F} = \overline{\overline{D_1} + \overline{D_3}\,\overline{D_2} + D_1\overline{D_0}}$

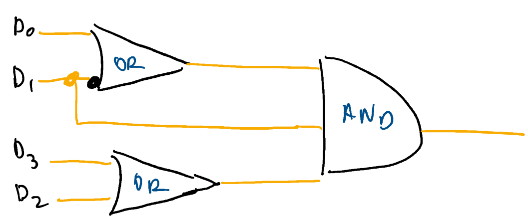
$\overline{F} = D_1(\overline{\overline{D_3}\,\overline{D_2}})(\overline{D_1\overline{D_0}})$

$\overline{F} = \boxed{D_1(D_3+D_2)(\overline{D_1}+D_0)}$

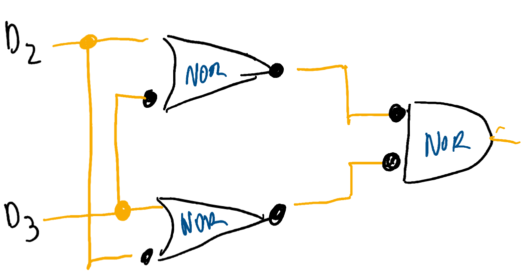
Lose Logic AND/OR



Win logic AND/OR



Lose Logic NOR/NOR



Win Logic NOR/NOR