REPORT

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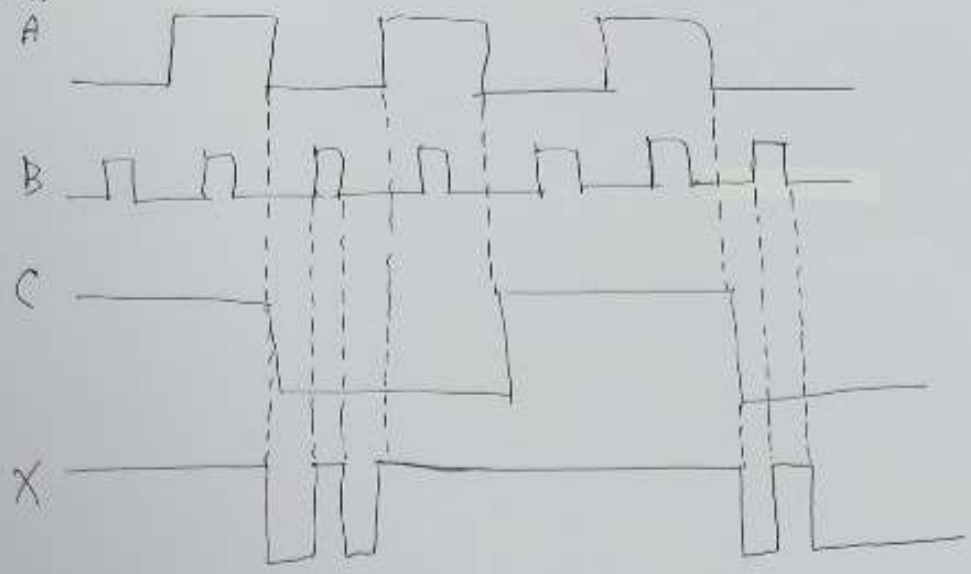
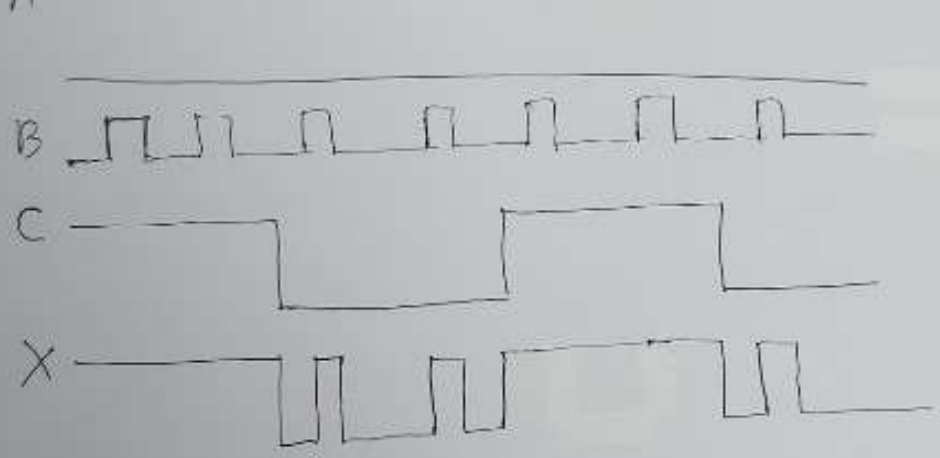
제출일 |

3-1) (a)



(B)



(C)

(A가 항상 High이므로 B,C에 관계없이 X는 항상 1이다)

3-2)
$$\begin{array}{r} 01011100 \\ +\ 10001101 \\ \hline 11011101 \end{array}$$

∴ 11011101

3-3) (a)

A: 0010010011

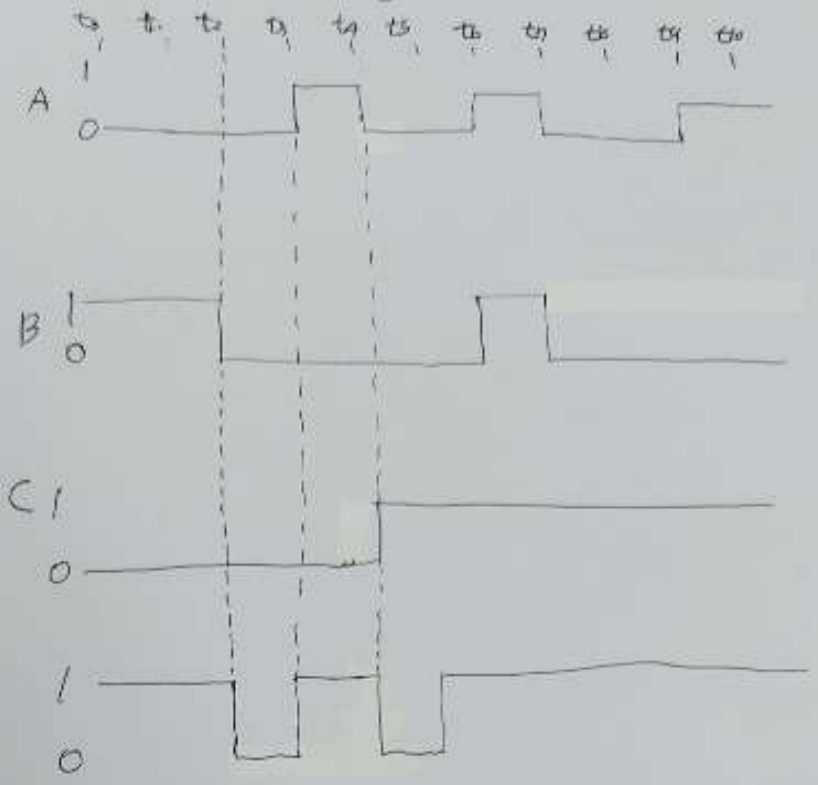
B: 1000010000

C: 0000111111

A+B+C

: 1010111111

<timing diagram>

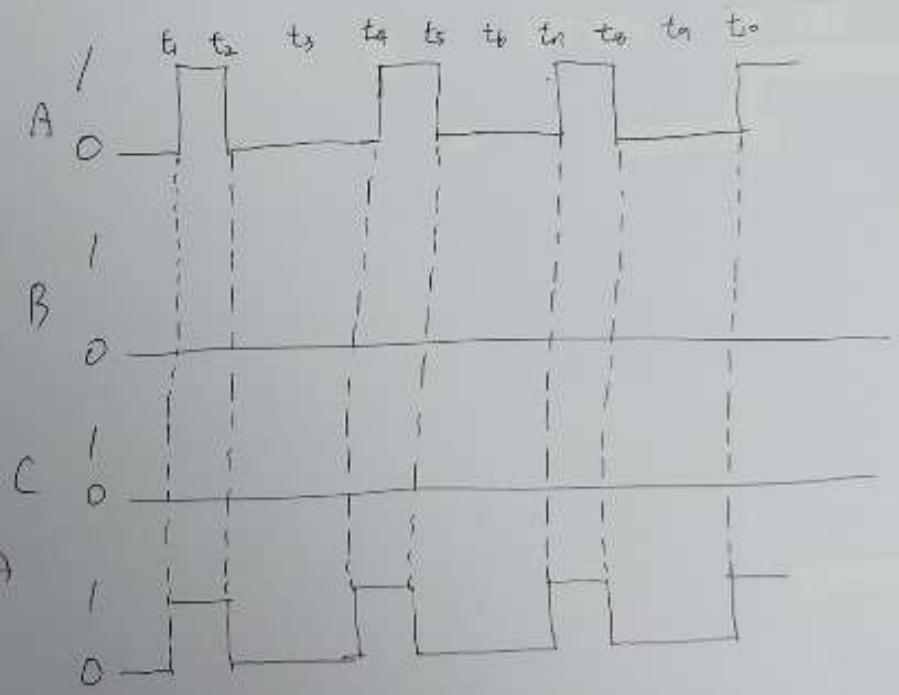


(b)

A: 100100101

A+B+C = A

: 100100101

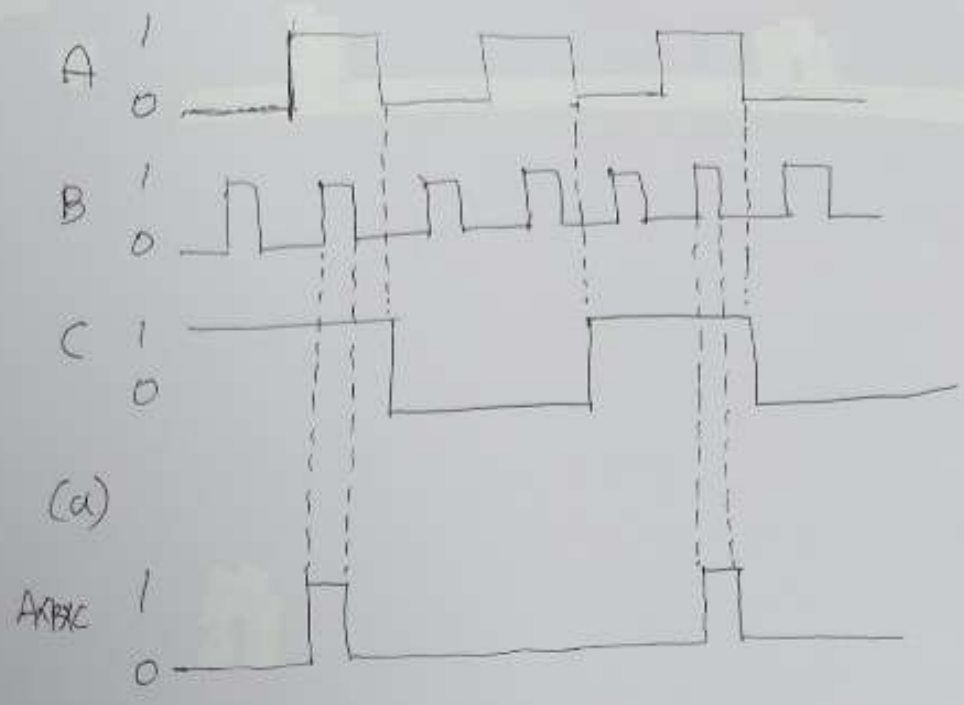


3-5)

$$\begin{array}{r} 1101\ 1000 \\ \times\ 1100\ 1101 \\ \hline 11001000 \end{array}$$

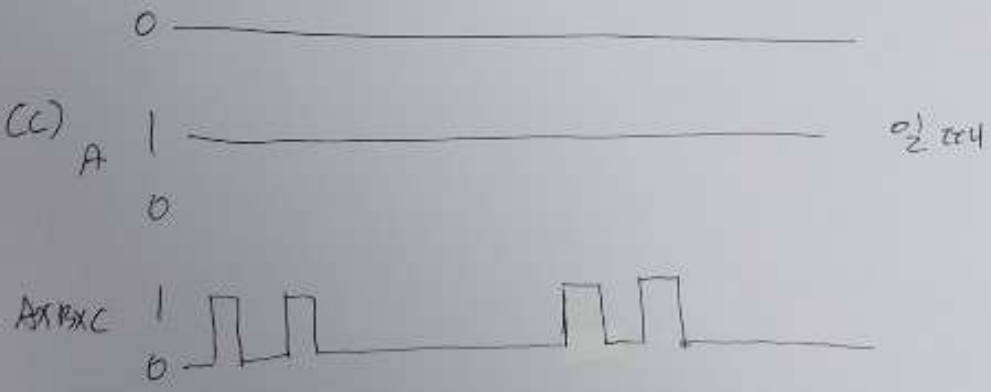
∴ 11001000

3-6)



(b)

(c)



3-9) n-input gate에서 And gate와 OR gate가 같은 결과를 내려면 각각의 two inputs 가운데 0 이거나 1 이어야 한다.

∴ n개의 input이 모두 같아야 한다.

3-12) (a) $\overline{(\overline{A}+\overline{B})}BC = X \rightarrow ABC$

<truth table>

a	b	c	X
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

(b) $\overline{A}B\overline{C} + \overline{A}B\overline{C} + \overline{A}BD = X$

$X = \overline{B}(\overline{A}\overline{C} + A\overline{C} + \overline{A}D)$

$X = \overline{B}(\overline{C}(\overline{A}+A) + \overline{A}D)$

$X = \overline{B}(\overline{C} + \overline{A}D)$

<truth table>

a	b	c	d	X
0	0	0	0	1
0	0	0	1	1
0	0	1	0	0
0	1	0	0	0
1	0	0	0	0
0	0	1	1	1
0	1	0	1	0
0	1	1	0	0
1	0	1	0	0
1	1	0	0	0
1	0	0	1	1
0	1	1	1	0
1	0	1	1	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

3-14) (a) $X = [D + \overline{(A+B)C}] \cdot E$

after AND ↔ OR, $[D \cdot \overline{AB+C}] + E$, $D \cdot \overline{ABC} + E$

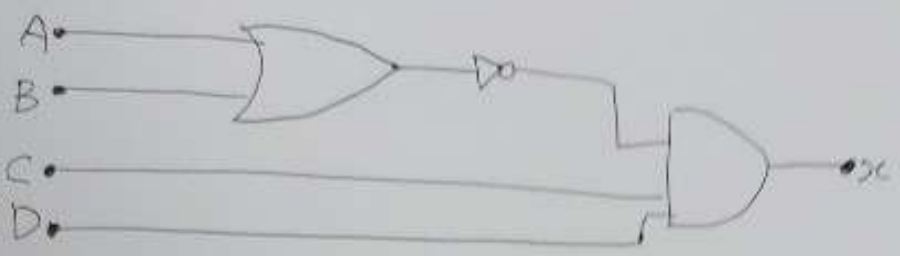
(b) next page..

3-14) (b)

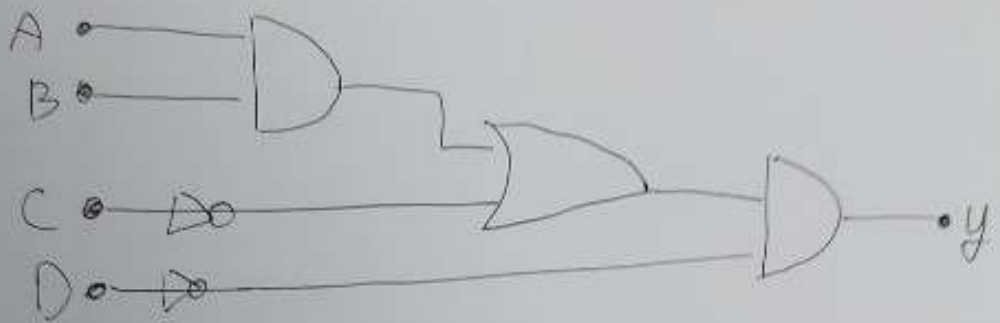
A	B	C	D	E	A · B	AB + C	D · $\overline{AB+C}$	D · $\overline{AB+C}$ + E
0	0	0	0	0	0	1	0	0
0	0	0	0	1	0	1	0	1
0	0	0	1	0	0	1	1	1
0	0	0	1	1	0	1	1	1
0	0	1	0	0	1	0	0	0
0	0	1	0	1	1	0	0	1
0	0	1	1	0	1	0	0	0
0	0	1	1	1	1	0	0	1
0	1	0	0	0	0	1	0	0
0	1	0	0	1	0	1	0	1
0	1	0	1	0	0	1	1	1
0	1	0	1	1	0	1	1	1
0	1	1	0	0	1	0	0	0
0	1	1	0	1	1	0	0	1
0	1	1	1	0	1	0	0	0
0	1	1	1	1	1	0	0	1
1	0	0	0	0	0	1	0	0
1	0	0	0	1	0	1	0	1
1	0	0	1	0	0	1	1	1
1	0	0	1	1	0	1	1	1
1	0	1	0	0	1	0	0	0
1	0	1	0	1	1	0	0	1
1	0	1	1	0	1	0	0	0
1	0	1	1	1	1	0	0	1
1	1	0	0	0	1	0	0	0
1	1	0	0	1	1	0	0	1
1	1	0	1	0	1	0	0	0
1	1	0	1	1	1	0	0	1
1	1	1	0	0	1	0	0	0
1	1	1	0	1	1	0	0	1
1	1	1	1	0	1	0	0	0
1	1	1	1	1	1	0	0	1

3-16)

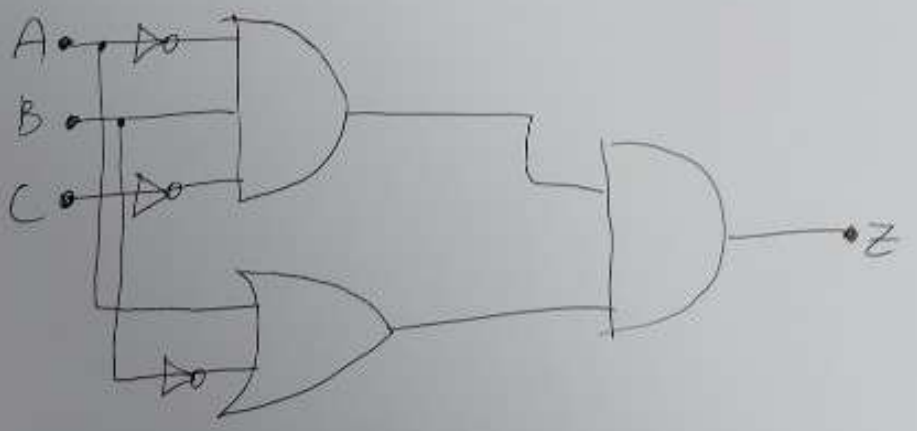
(a) $x = (\overline{A+B})CD$



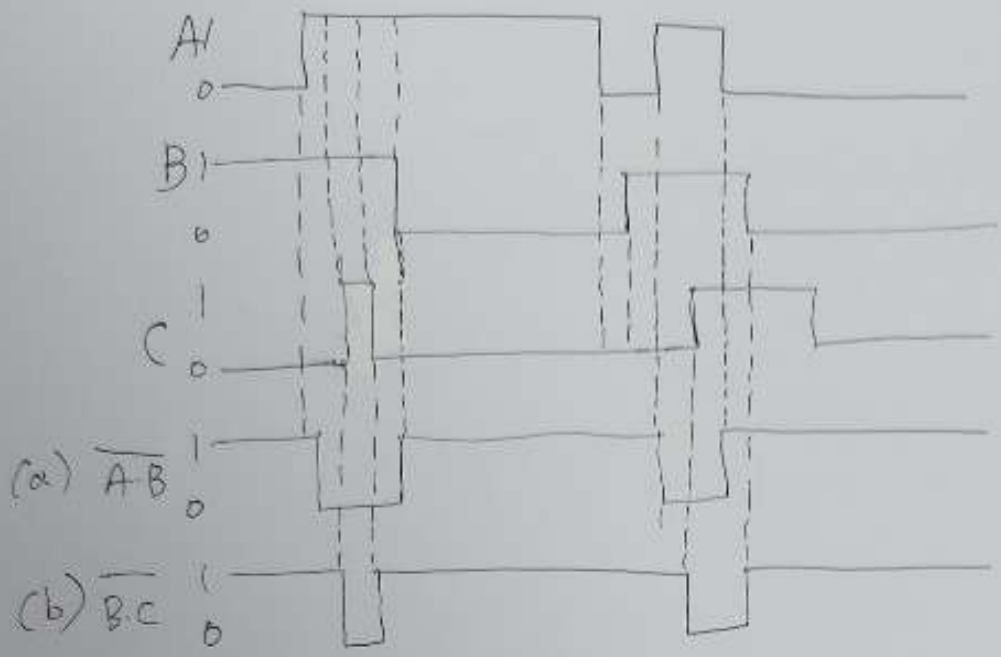
(b) $y = (AB+C)\overline{D}$



(c) $Z = \overline{A}BZ(A+\overline{B})$



3-18)



3-23) (a) $A+A=A$, $0+0=0$, $1+1=1$

(b) $x \cdot 0 \cdot y = 0$, AND 게이트는 0이 하나이상이면 결과가 0.

(c) $A\bar{B}+AB=A$, $A(\bar{B}+B)=A$

(d) $C(C+B)=C$, $0(0+B)=0$, $1(1+B)=1$

(e) $x+xy=x$, $x(1+y)=x$

(f) $x+0+\bar{x}=1$, $x+\bar{x}=1$ 이므로 $1+0=1$

(g) $\bar{A}+AB=\bar{A}+B$, $(\bar{A}+A)(A+B)=\bar{A}+B$

(h) $(x+y)(y+z)=x+y$, $x+y$가 2번중복되므로 하나를 지운다

(i) $\bar{P}+P\bar{Q}=\bar{P}+\bar{Q}$, $(\bar{P}+P)(\bar{P}+\bar{Q})=\bar{P}+\bar{Q}$

(j) $\overline{xy}+\overline{(xy)}=1$, $\overline{(xy)}=\overline{x+y}=xy \rightarrow \overline{xy}+xy=1$

3-24) (a) $x = (M+N)(\overline{M}+P)(\overline{N}+\overline{P})$

$= (M\overline{M} + MP + N\overline{M} + NP)(\overline{N}+\overline{P})$

$= MP\overline{N} + M\overline{M}\,\overline{M} + M\overline{N}\,\overline{P} + MP\overline{P} + N\overline{M}\,\overline{P} + NP\overline{P}$

$= MP\overline{N} + N\overline{M}\,\overline{P}$

(b) $z = A\overline{B}\,\overline{C} + A\overline{B}C + \overline{B}CD$

$= \overline{B}\,\overline{C}(\underbrace{\overline{A}+A}_{1}+D)$

$= \overline{B}\,\overline{C}\,\underbrace{(1+D)}_{1}$

$= \overline{B}\,\overline{C}$

3-26)

(a) $\overline{\overline{A}+\overline{B}+C} = A\overline{B}\,\overline{C}$

(b) $\overline{\overline{\overline{A}B} + \overline{\overline{B}C}} = \overline{A+\overline{B}+B+\overline{C}} = \overline{A+\overline{C}+1} = 0$

(c) $\overline{(\overline{A+B})(A+\overline{B})} = (A+B)+\overline{(\overline{A+\overline{B}})} = A+B+AB = A+B$

(d) $\overline{\overline{A}+\overline{(B+C)}+\overline{D}} = AD(B+C)$

(e) $\overline{\overline{A}\,\overline{(\overline{B}C)}\cdot\overline{D}} = A+\overline{B}C+D$

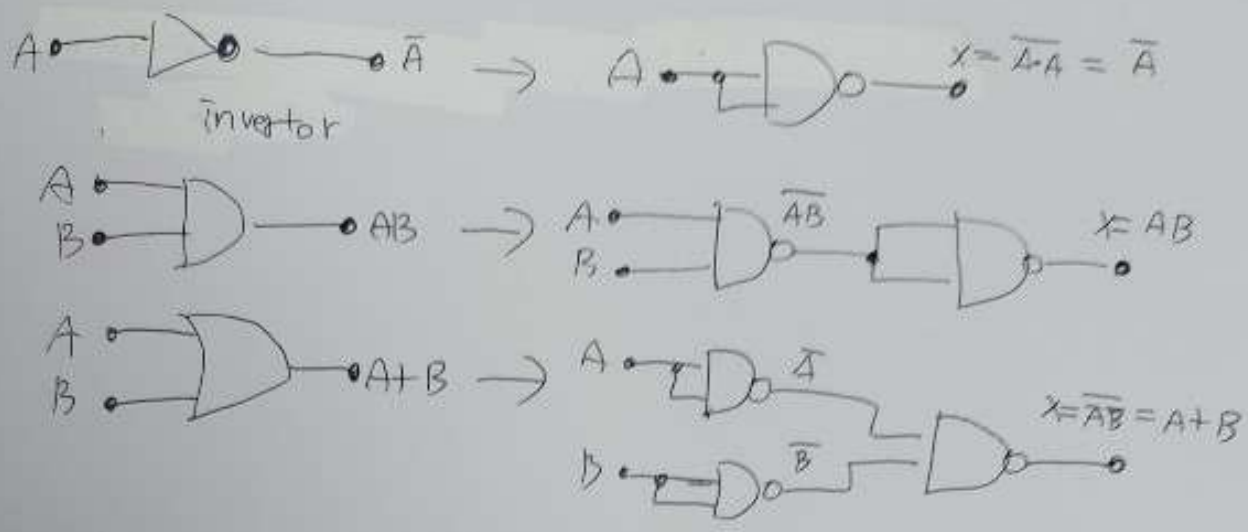
(f) $\overline{\overline{A}\cdot(\overline{B}+C)} = A+\overline{(\overline{B}+C)} = A+B\overline{C}$

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

(h) $\overline{\overline{A}B\overline{(A+B)}} = A+\overline{B}+(\overline{A}+B) = 1+1 = 1$

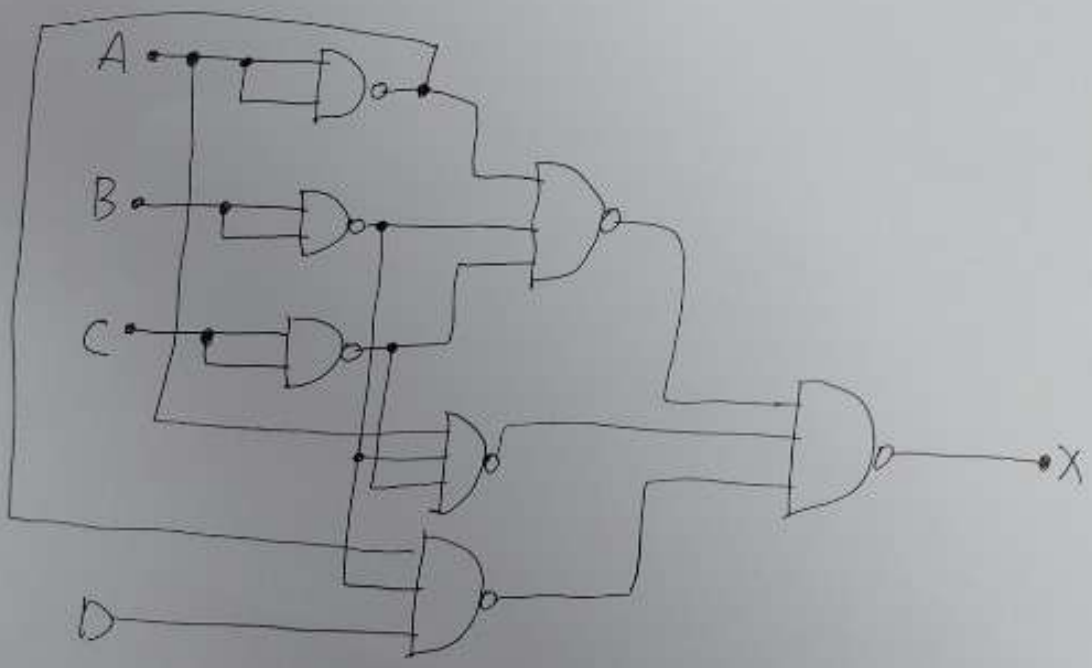
(i) $\overline{\overline{(A+B)}+\overline{C}} = (A+B)\cdot C$

3-28) $X = \bar{A}\bar{B}\bar{C} + A\bar{B}\bar{C} + \bar{A}\bar{B}D$



또는 $X = \overline{(\overline{A\bar{B}\bar{C}}) \cdot (\overline{A\bar{B}\bar{C}}) \cdot (\overline{\bar{A}\bar{B}D})}$

또는 $X = \bar{A}\bar{B}\bar{C} + A\bar{B}\bar{C} + \bar{A}\bar{B}D$

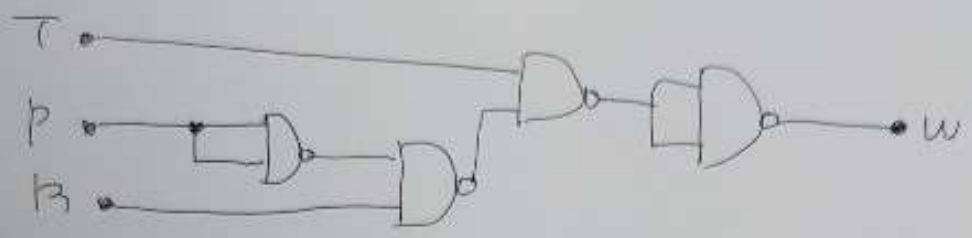


3-32) (a) T=1 이고 (P,R)이 (0,0) 이나 (1,1)이나 (1,0) 일때 조종사에게 경고를 준다.

(b) next page

3-32) (b) $W = T(P + B)$

$= \overline{\overline{T(\overline{P}\overline{B})}}$



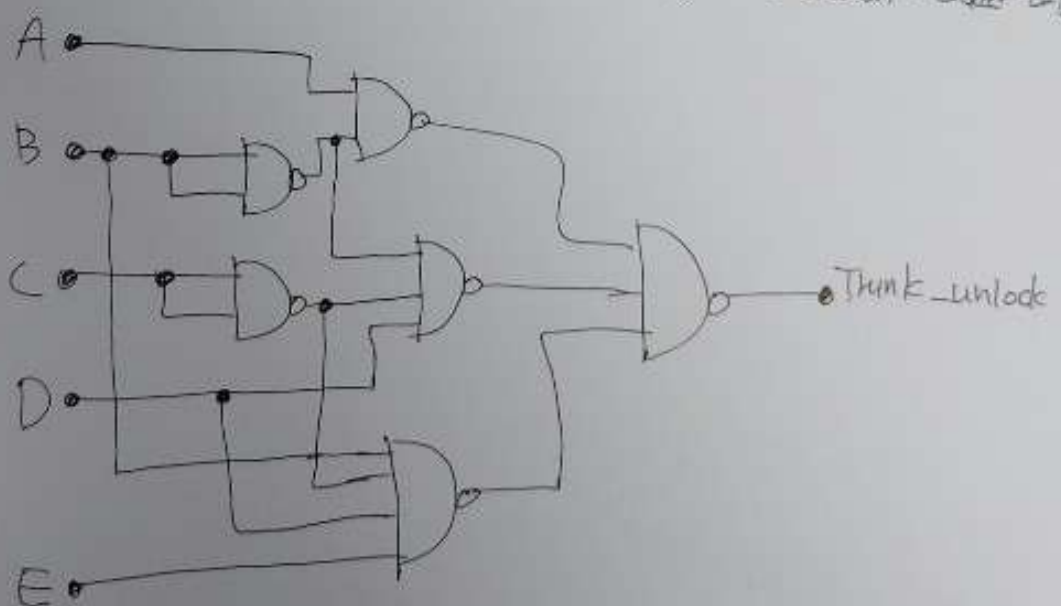
3-33) (a) If (button on ~~trunk lid~~ key fob is pressed AND engine status is motor on)

OR (engine status is off AND condition of door locks is unlocked AND button on trunk lid is pressed)

OR (engine status is motor on AND condition of door locks is unlocked AND button on trunk lid is pressed AND parking brake is set), then unlock trunk.

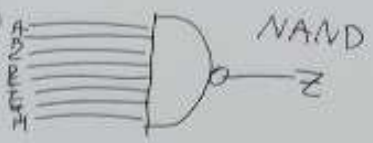
(b) $(F \cdot B \cdot \overline{Motor\_on}) + (\overline{Motor\_on} \cdot \overline{Locked} \cdot LID) + (Motor\_on \cdot \overline{Locked} \cdot LID \cdot PBrake)$

(c)

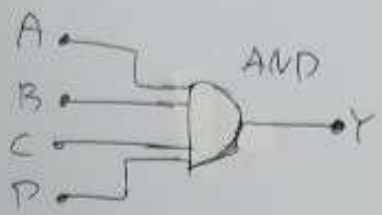


3-35) (a)

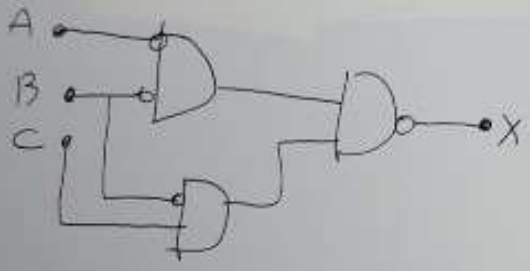
(c)



(b)



3-37) (a) $\overline{(A+B)}\ \overline{(B+\bar{C})}$



(b)

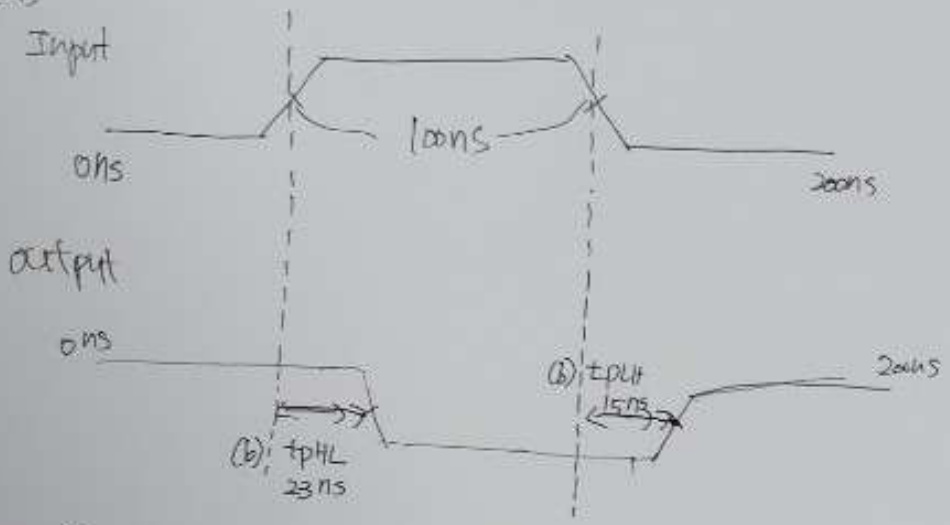
A	B	C	X
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	0

∴ A가 1이고 B가 0이고 C가 0일 때 만 작동한다.

3-40) A가 1이고 B가 0일 때, 또는 B, C 둘 다 0일 때 또는 C가 0일 때 또는 E가 1일 때 출력이 안정 상태가 된다.

3-44)

(a)



(c) 100ns − 23ns + 15ns = 92ns