



EGC221

Class Notes

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□ **TABLE 2-6**

Basic Identities of Boolean Algebra

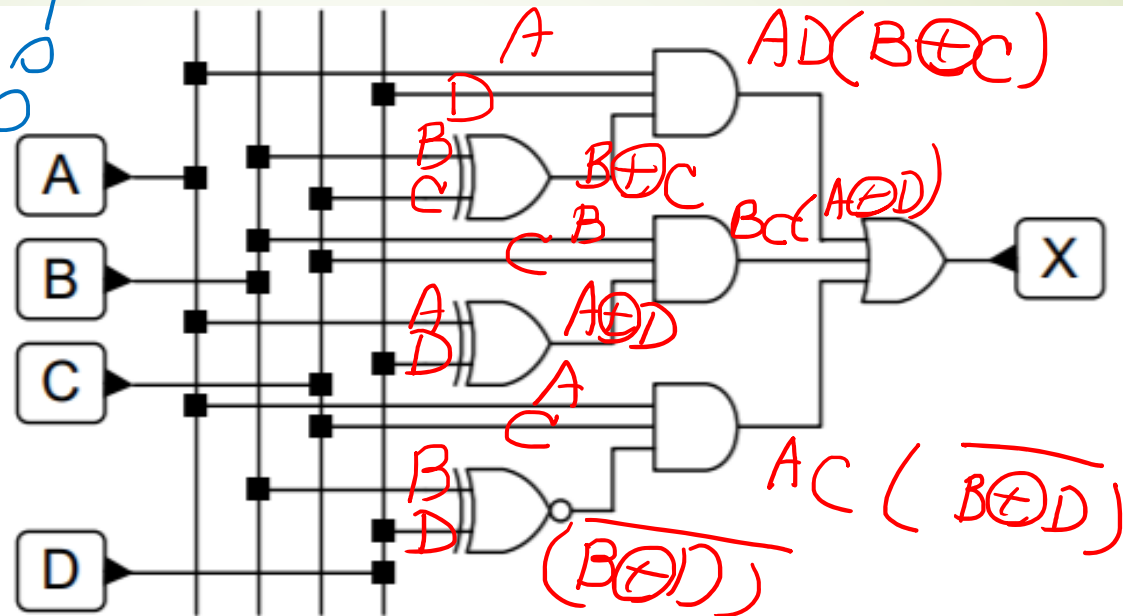
1. $X + 0 = X$	2. $X \cdot 1 = X$	
3. $X + 1 = 1$	4. $X \cdot 0 = 0$	
5. $X + X = X$	6. $X \cdot X = X$	
7. $X + \bar{X} = 1$	8. $X \cdot \bar{X} = 0$	
9. $\bar{\bar{X}} = X$		
10. $X + Y = Y + X$	11. $XY = YX$	Commutative
12. $X + (Y + Z) = (X + Y) + Z$	13. $X(YZ) = (XY)Z$	Associative
14. $X(Y + Z) = XY + XZ$	15. $X + YZ = (X + Y)(X + Z)$	Distributive
16. $\overline{X + Y} = \bar{X} \cdot \bar{Y}$	17. $\overline{X \cdot Y} = \bar{X} + \bar{Y}$	DeMorgan's

$$\begin{array}{cc|c}
 B & C & B \oplus C \\
 \hline
 0 & 0 & 0 \\
 0 & 1 & 1 \\
 1 & 0 & 1 \\
 1 & 1 & 0
 \end{array}$$

$$B \oplus C = \bar{B}C + B\bar{C}$$

$$X = \sum m(7, 10, 13, 14, 15)$$

$$(B \oplus C) = \bar{B}\bar{C} + BC$$



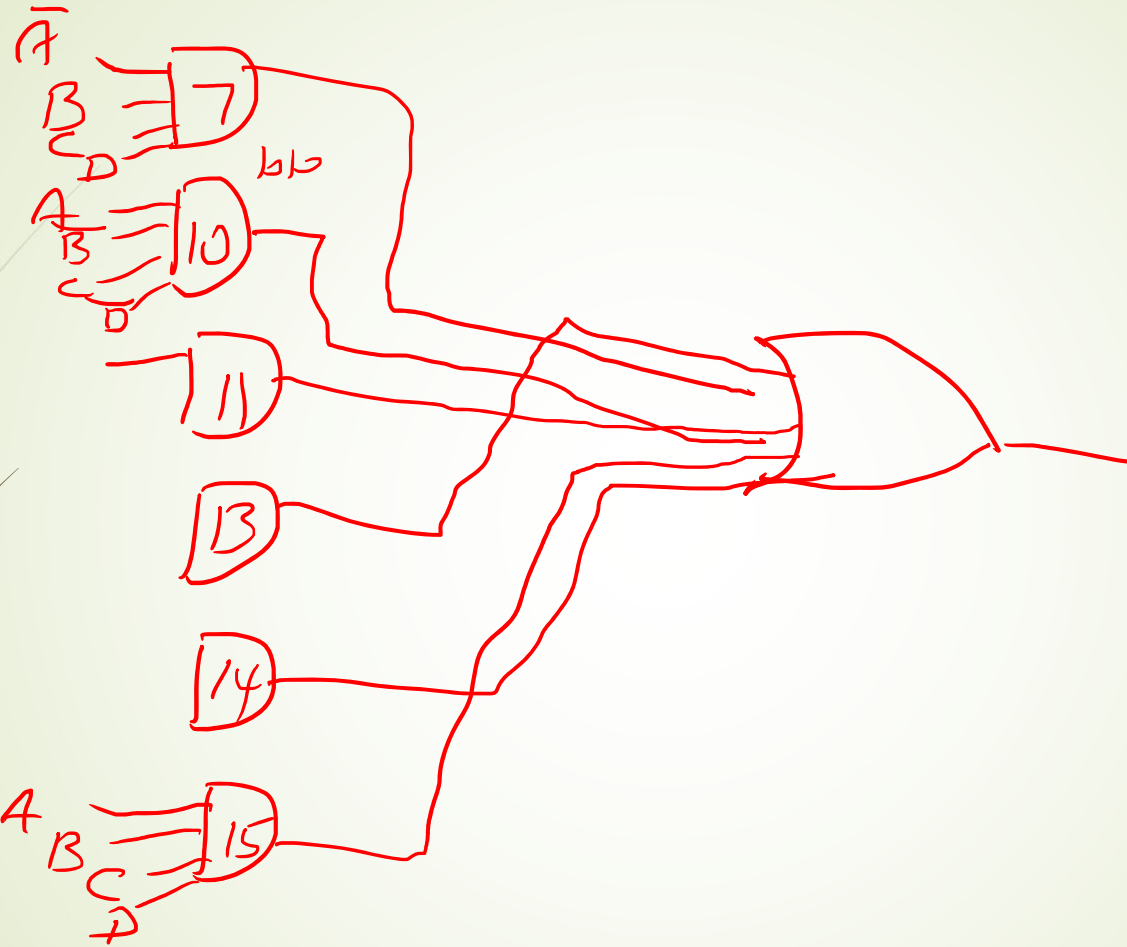
$$X = AD(B \oplus C) + BC(A \oplus D) + AC(\overline{B \oplus D})$$

$$= AD(\bar{B}C + B\bar{C}) + BC(\bar{A}D + A\bar{D}) + AC(\bar{B}\bar{D} + BD)$$

Standard
sum of Prod.
sum of min terms

$$= \underbrace{A\bar{B}CD}_{m_1} + \underbrace{AB\bar{C}D}_{m_3} + \underbrace{\bar{A}BCD}_{m_7} + \underbrace{ABC\bar{D}}_{m_{14}} + \underbrace{A\bar{B}C\bar{D}}_{m_{10}} + \underbrace{ABCD}_{m_{15}}$$

A → Do



$$F = \sum m(7, 10, 11, 13, 14, 15) \quad BcD(\bar{A}+A)$$

$$= \bar{A}BC\bar{D} + A\bar{B}C\bar{D} + A\bar{B}C\bar{D} + A\bar{B}C\bar{D} + A\bar{B}C\bar{D} + A\bar{B}C\bar{D}$$

	$\bar{C}$	C		
$\bar{A}$	00	01	11	10
$\bar{A}$	0	1	3	2
$\bar{A}$	4	5	7	6
A	12	13	15	14
A	8	9	11	10

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

$$ABC(\bar{D}+D)$$

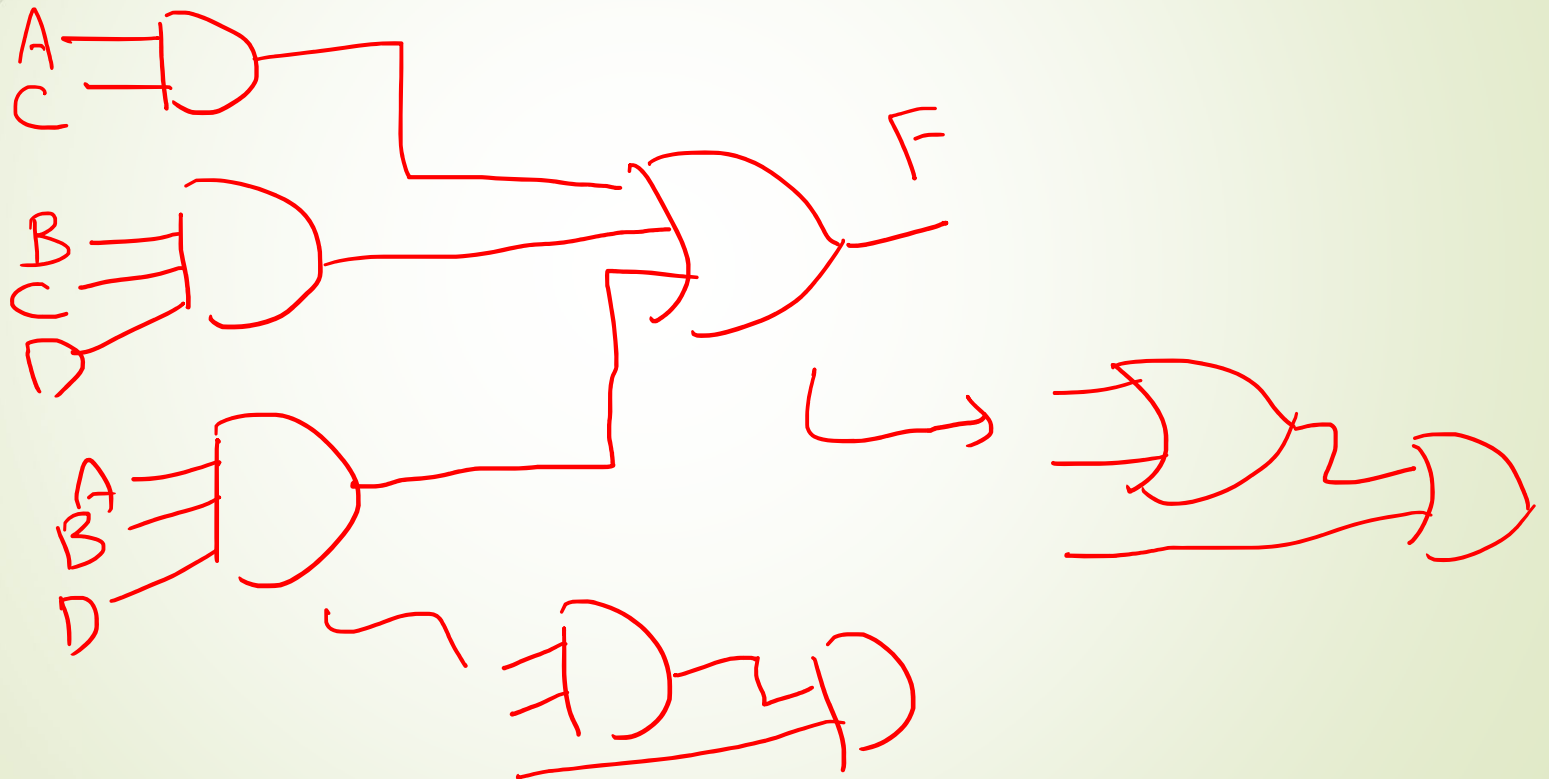
$$AC(\bar{B}+B)$$

$$F = AC + BCD + ABD$$

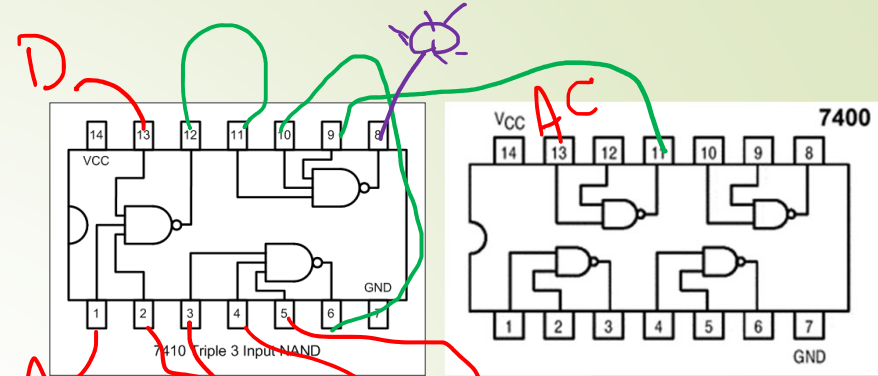
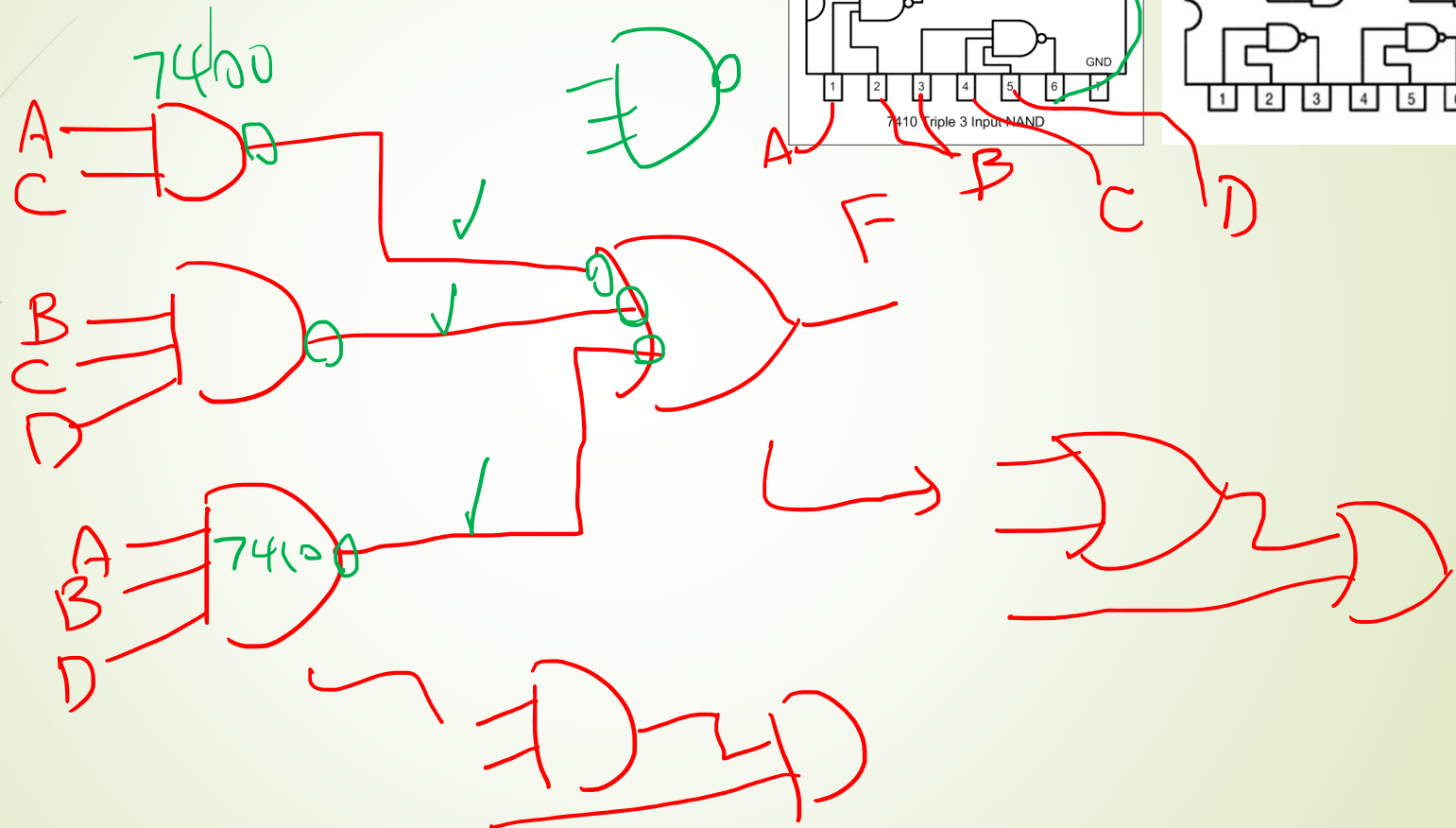
$$\frac{x}{z} \equiv D \Leftrightarrow \frac{x}{z} = D$$

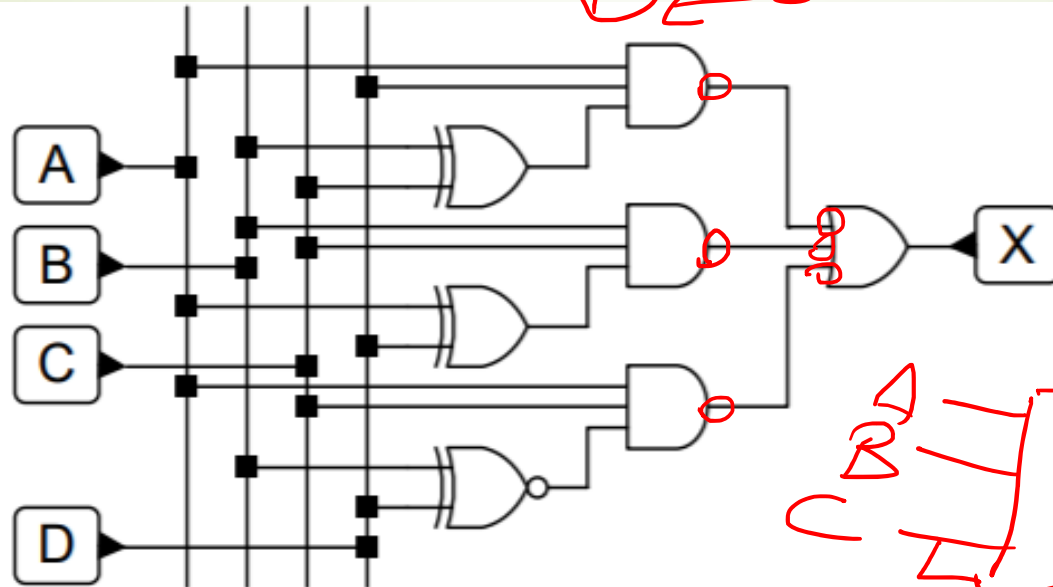
$$\frac{x}{z} \equiv D \Leftrightarrow \frac{x}{z} = D$$

$$F = AC + BCD + ABD$$



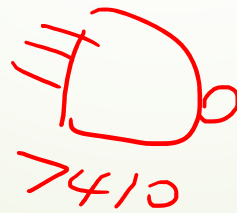
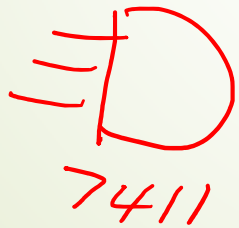
$$F = AC + BCD + ABD$$





7410 $\Rightarrow$ FD

$ABC\bar{C}$
 $= ABC$



7420