Demorgan's Law

$\overline{AB} = \bar{A} + \bar{B}$

$\overline{A+B} = \bar{A} \cdot \bar{B}$

$Y = \bar{A} + BC$

$= \overline{\bar{A} + BC}$

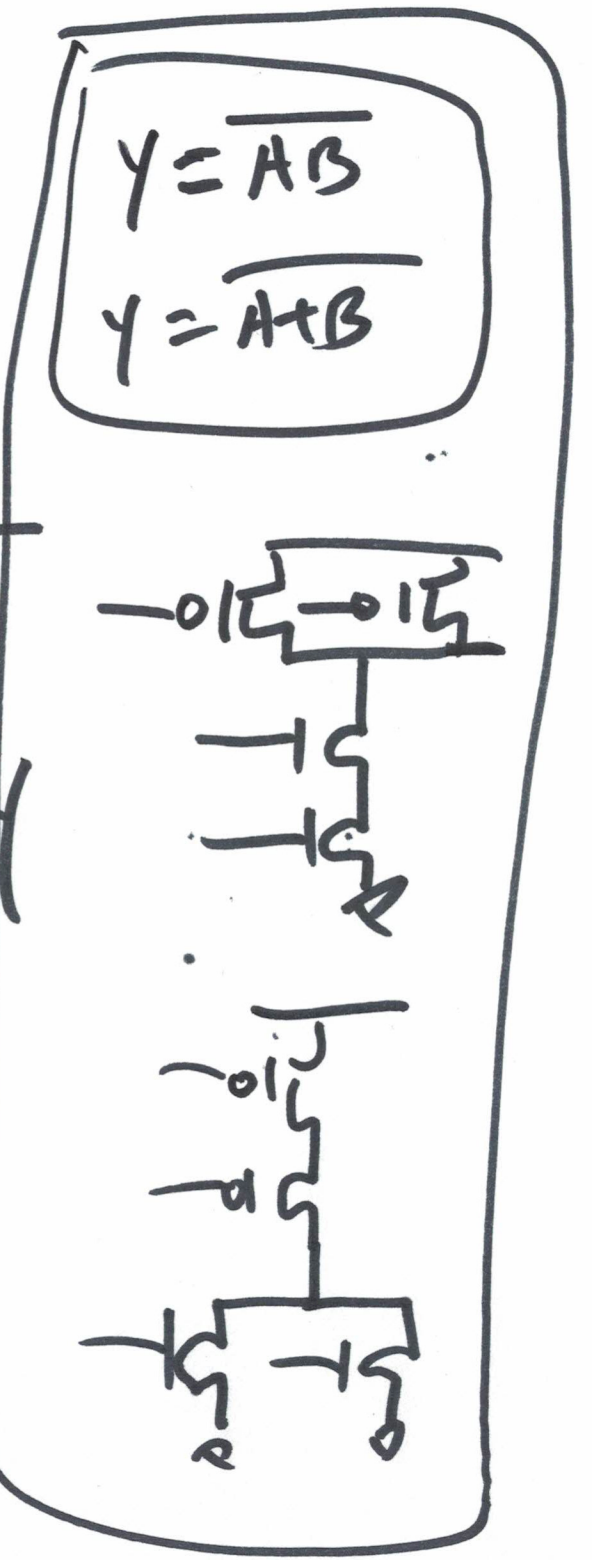
$= \overline{\bar{A}} \cdot \overline{BC}$

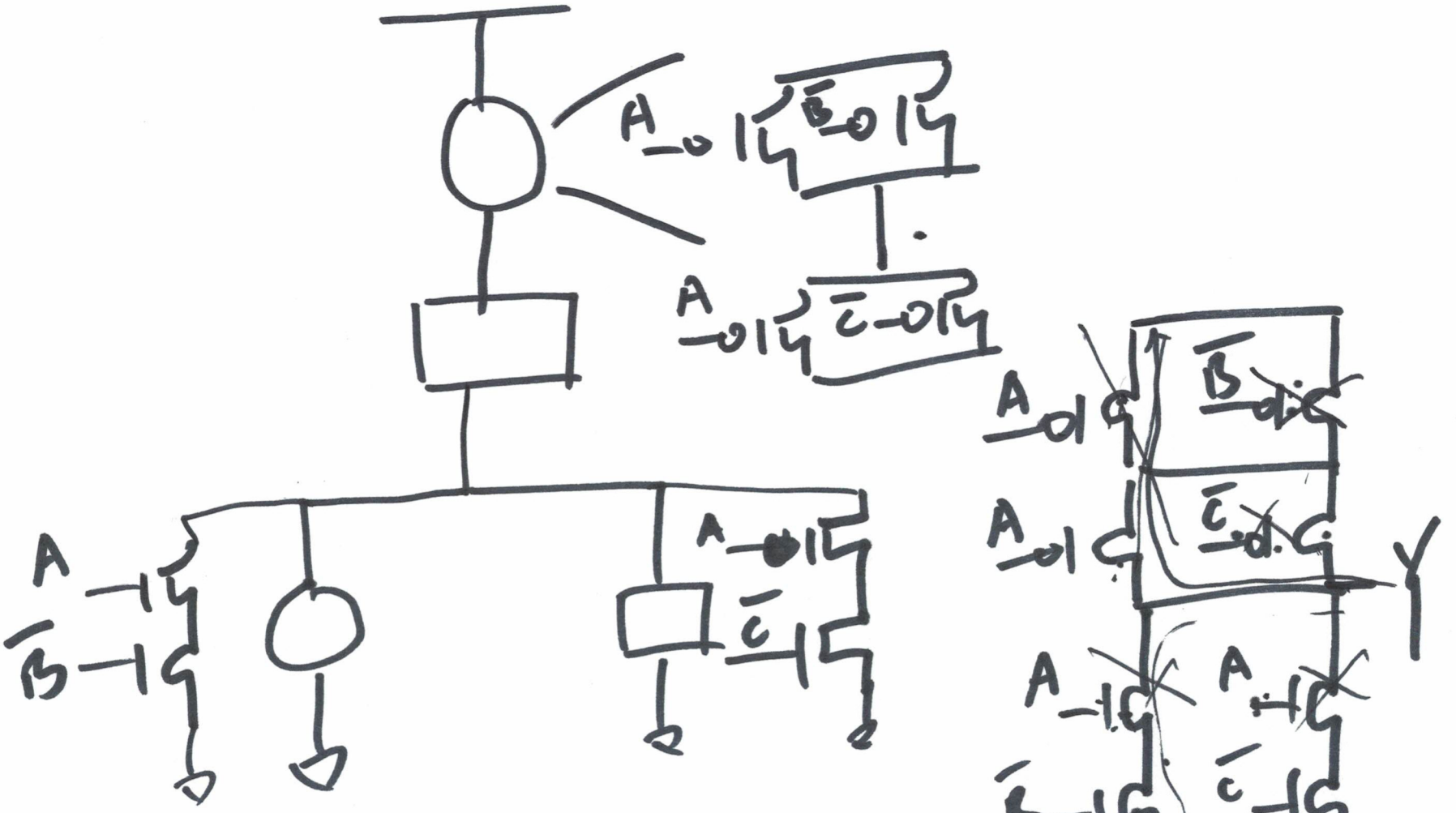
$= A \cdot (\bar{B} + \bar{C})$

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

| A | B | Y |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

$\overline{AB} =$ Y





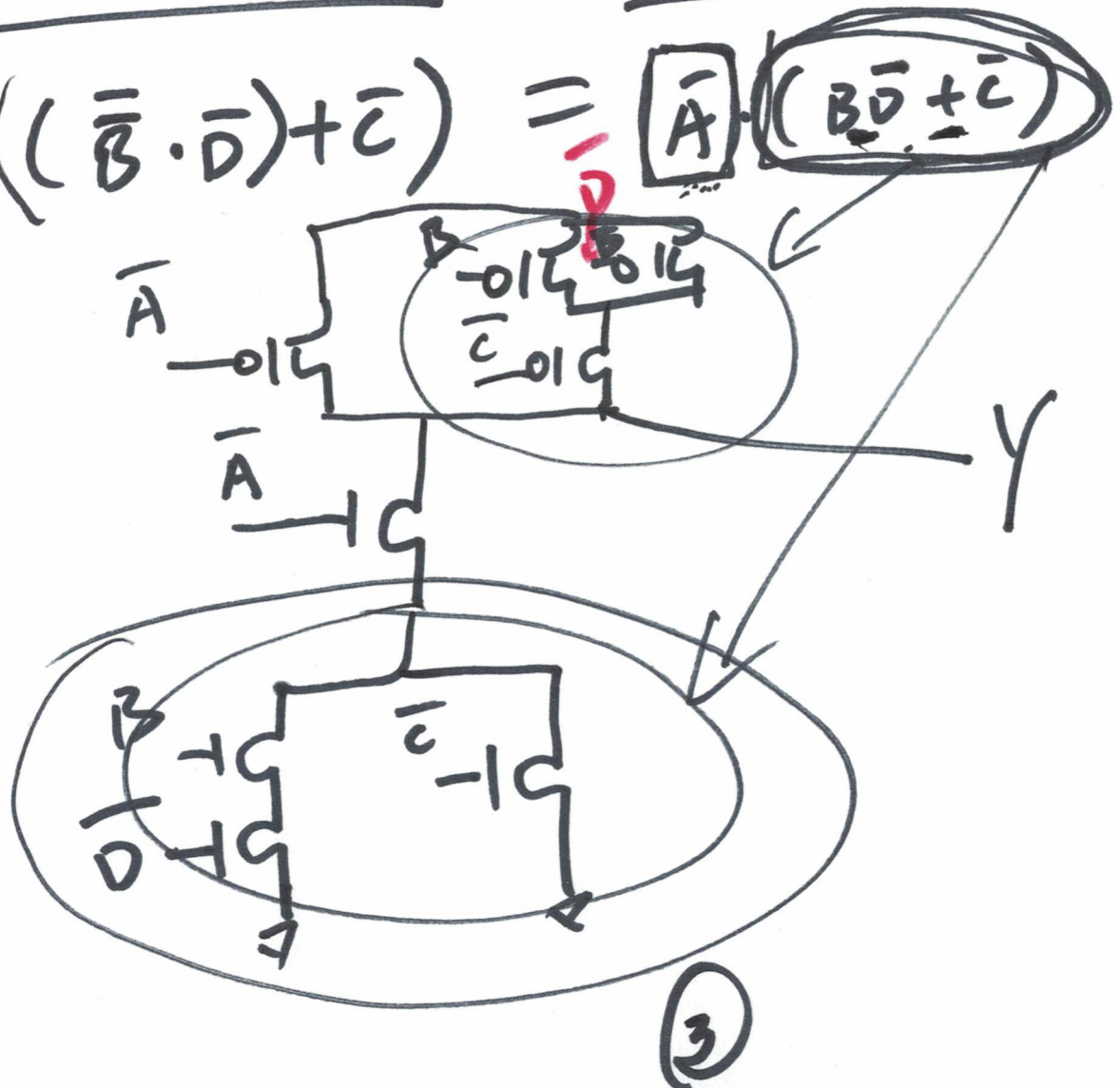

$$Y = \bar{A} + BC$$

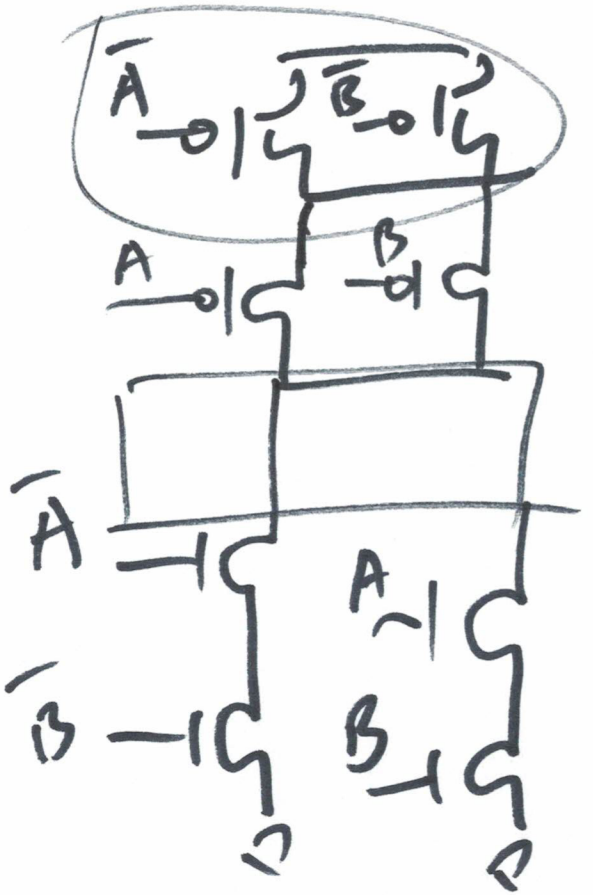
| A | BC | Y |
|---|---|---|
| 0 | 00 | 1 |
| 0 | 01 | |
| 1 | 01 | 0 |

$$Y = A + \bar{B}C + CD = \overline{\overline{A + \bar{B}C + CD}}$$

$$= \overline{A + (\bar{B} + D)C} = \bar{A} \cdot \overline{(\bar{B} + D)C} = \bar{A}\left(\overline{(\bar{B} + D)} + \bar{C}\right)$$

$$= \bar{A} \cdot \left((\bar{\bar{B}} \cdot \bar{D}) + \bar{C}\right) = \bar{A} \cdot (B\bar{D} + \bar{C})$$



XOR: $Y = A \oplus B = \bar{A}B + A\bar{B}$

$$= \overline{\bar{A}B + A\bar{B}} = \overline{\bar{A}\cdot\bar{B} + AB}$$