

Homework 4

Apply Demorgan's theorems to each expression

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

a. $\overline{A+B}$

$$\begin{aligned} a. &= \overline{A+B} \\ &= \bar{A} \bar{B} \end{aligned}$$

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

$$\begin{aligned} &= \overline{(A+\bar{B})} + \overline{(C+D)} \\ &= \bar{A} \bar{\bar{B}} + \bar{C} \bar{D} \\ &= \bar{A} B + \bar{C} \bar{D} \end{aligned}$$

b. $AC(\bar{B}+C)$

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

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

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

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

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

AB \ C	0	1
00		
01		
11		1
10		1

$$\begin{array}{c|c} A & B \\ \hline 1 & 0 \\ 1 & 1 \end{array} \quad C = \begin{array}{c} 1 \\ 1 \end{array}$$

c. $\bar{A}(BC+B\bar{C}) + A(BC+B\bar{C})$

$$= \bar{A}BC + \bar{A}B\bar{C} + ABC + AB\bar{C}$$

AB \ C	0	1
00		
01	1	1
11	1	1
10		

AB C
0 1 0
0 1 0
1 1 1
1 1 1

$$= B \text{ SOP}$$

$$= AC \text{ SOP}$$