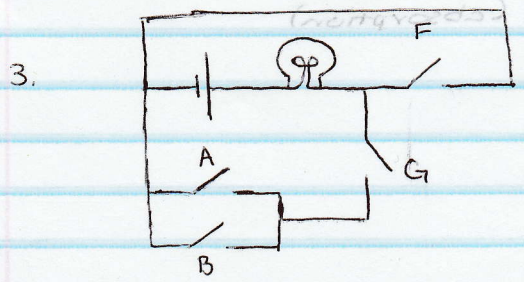Andy Zhang

Feb 8 2023   Boolean Algebra Practice

1. a) $(A + B) + \bar{B}$

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

$= A + 1$

$= 1$

b) $AA + BC + B\bar{C}$

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

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

$= A + B(1)$

$= A + B$

c) $\bar{A} + C + AB$

$= \bar{A} + (CA)(CB)$

Can't simplify

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

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

$= \bar{A}B + 0C$

$= \bar{A}B$

2.

A	B	C	AB	AB + $\bar{C}$
1	1	1	0	1
1	1	0	1	1
1	0	1	0	0
1	0	0	0	1
0	1	1	0	0
0	1	0	0	1
0	0	1	0	0
0	0	0	0	1

3.

4. a) $\bar{A}(B + A)$

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

$= \bar{A}B + 0$

$= \bar{A}B$

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

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

$= CB + CA\bar{B}$

Boolean Algebra Practice (continued)

4. c) $ABC + A\bar{B}C + AB\bar{C}$

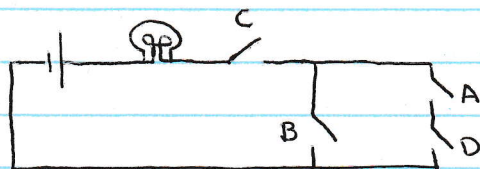$= AB(C + \bar{C}) + A\bar{B}C$

$= AB(1) + A\bar{B}C$

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

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

$= B + AC\bar{A}$

$= B + C0$

$= B$

5.

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

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

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

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

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

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

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

$= AB + BC$

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

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

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

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

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

$= 1 + C + \bar{B}$

$= 1$

SWAPPED

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

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

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

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

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

$= A + B$

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

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

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

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

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