1. Simplify the Boolean expression **using Boolean algebra**.

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

$= A$

b. $AA + BC + B\overline{C}$. $=$

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

c. $\overline{A} + C + AB$. $= \overline{A} + AB + C$

$\overline{A} + B \qquad + C$

d. $\overline{A}(B + AC)$. $= \overline{A}B + \overline{A}AC \qquad = \overline{A}B$

0

2. Create the Boolean Table for $AB + \overline{C}$

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

3. Simplify each Boolean expression:

a. $\overline{A}(B+A)$.

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

c. $ABC + A\overline{B}C + AB\overline{C}$

d. $(B+AC)(B+\overline{A})$

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

b. $(B+A\overline{B})(C+AC)$ $= BC + ABC + A\overline{B}C + AA\overline{B}C$

$= BC + ABC + A\overline{B}C$

Factor out AC

$= BC + AC(B + \overline{B})$

$= BC + AC = C(A + B)$

You might also have seen $(C + AC) = C$

3. Simplify each Boolean expression:

c. $ABC + A\overline{B}C + AB\overline{C}$

Factor out A: $A(BC + \overline{B}C + B\overline{C})$

Notice that inside the parenthesis is B + C
so this can simplify to

$A(B + C) = AB + AC$

d. $(B + AC)(B + \overline{A})$

Simplify $BB + B\overline{A} + ABC + \overline{A}AC$

$B + B\overline{A} + ABC + 0$

Simplify

$B + ABC$
$B(1 + AC)$
B

d. $(B+AC)(B+\overline{A})$ Really? This simplifies to B?

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

Yes - this does simplify to B