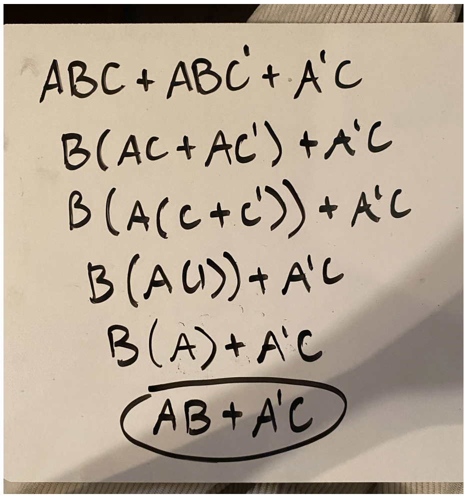
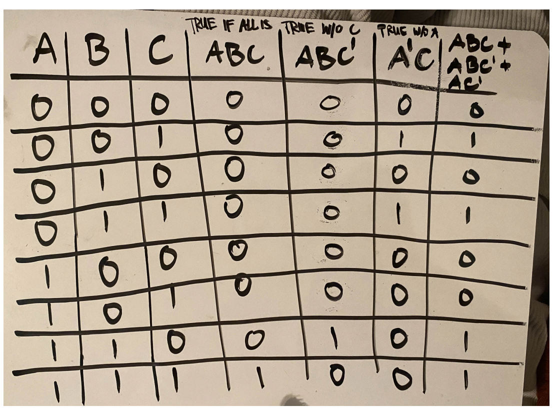
Assignment B-1 Boolean Algebra

Exercise 1: abc + abc’ + a’c

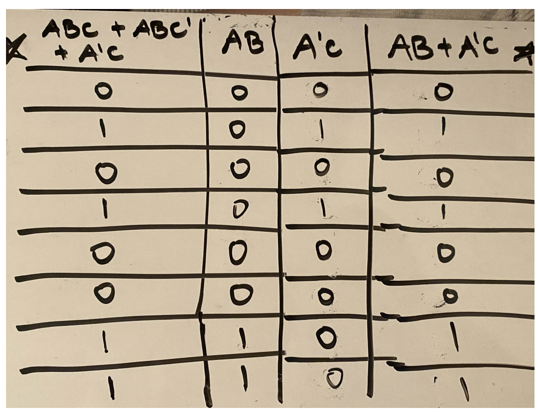
1. **Show the simplified Boolean algebra expression by using the rules.**



2. **Show that the simplified expression has the same truth table as the original expression.**



A	B	C	ABC (TRUE IF ALL IS)	ABC' (TRUE W/O C)	A'C (TRUE W/O A)	ABC+ABC'+A'C
0	0	0	0	0	0	0
0	0	1	0	0	1	1
0	1	0	0	0	0	0
0	1	1	0	0	1	1
1	0	0	0	0	0	0
1	0	1	0	0	0	0
1	1	0	0	1	0	1
1	1	1	1	0	0	1



ABC + ABC' + A'C	AB	A'C	AB+A'C
0	0	0	0
1	0	1	1
0	0	0	0
1	0	1	1
0	0	0	0
0	0	0	0
1	1	0	1
1	1	0	1

Yes they match.

3. **Elaborate how the original expression could be shortened.**

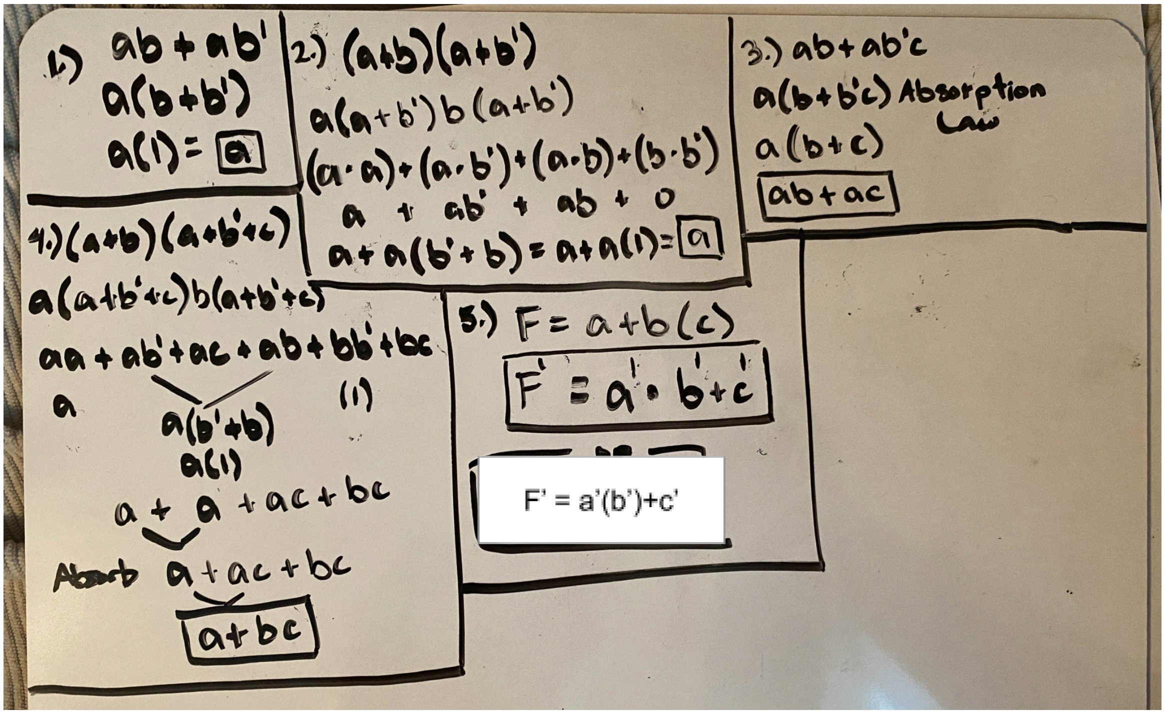
There’s two ways of going about it. Either by **using Boolean algebra** and learning how laws such as, Identity, Null, Idempotent, Complement, and Distributive in order to get what I got, which is **AB+A’C**

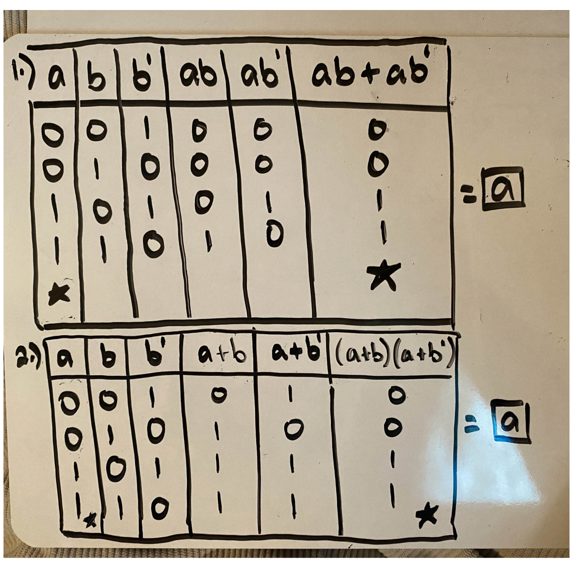
Or by using **Truth Tables** and using AND, OR, or NOT logic in figuring out how to simplify the original expression. We compared the original expression to the simplified version we got from using Boolean algebra and we got the same exact match, which confirms that this is correct.

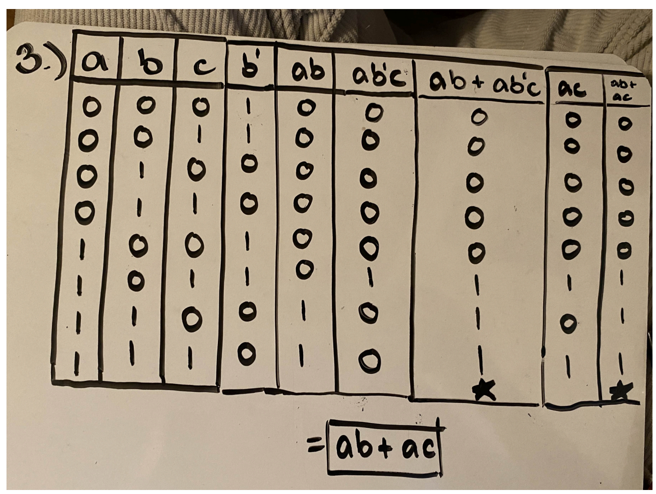
Exercise 2: Show the simplified Boolean algebra expressions and truth tables.

1. **Ab+ab’**

2. (a+b)(a+b’)
3. Ab+ab’c
4. (a+b)(a+b’+c)
5. Show the F’ (Negation of F) by using DeMorgan’s Law. F = a+b(c)







4.)

a	b	c	b'	a+b	a+b'+c	bc	a+bc	(a+b)(a+b'+c)
0	0	0	1	0	1	0	0	0
0	0	1	1	0	1	0	0	0
0	1	0	0	1	0	0	0	0
0	1	1	0	1	1	1	1	1
1	0	0	1	1	1	0	1	1
1	0	1	1	1	1	0	1	1
1	1	0	0	1	1	0	1	1
1	1	1	0	1	1	1	1 ★	★ 1

$= \boxed{a+bc}$

5.)

a	b	c	a'	b'	c'	a'b'	bc	a+b(c)	a'(b')+c'
0	0	0	1	1	1	1	0	0	1
0	0	1	1	1	0	1	0	0	1
0	1	0	1	0	1	0	0	0	1
0	1	1	1	0	0	0	1	1	0
1	0	0	0	1	1	0	0	1	1
1	0	1	0	1	0	0	0	1	0
1	1	0	0	0	1	0	0	1	1
1	1	1	0	0	0	0	1	1	0
									★

a(b)+c

AB

0 0 0 0 0 0 1 1

AB+C

0 1 0 1 0 1 1 1 ★ OPPOSITE