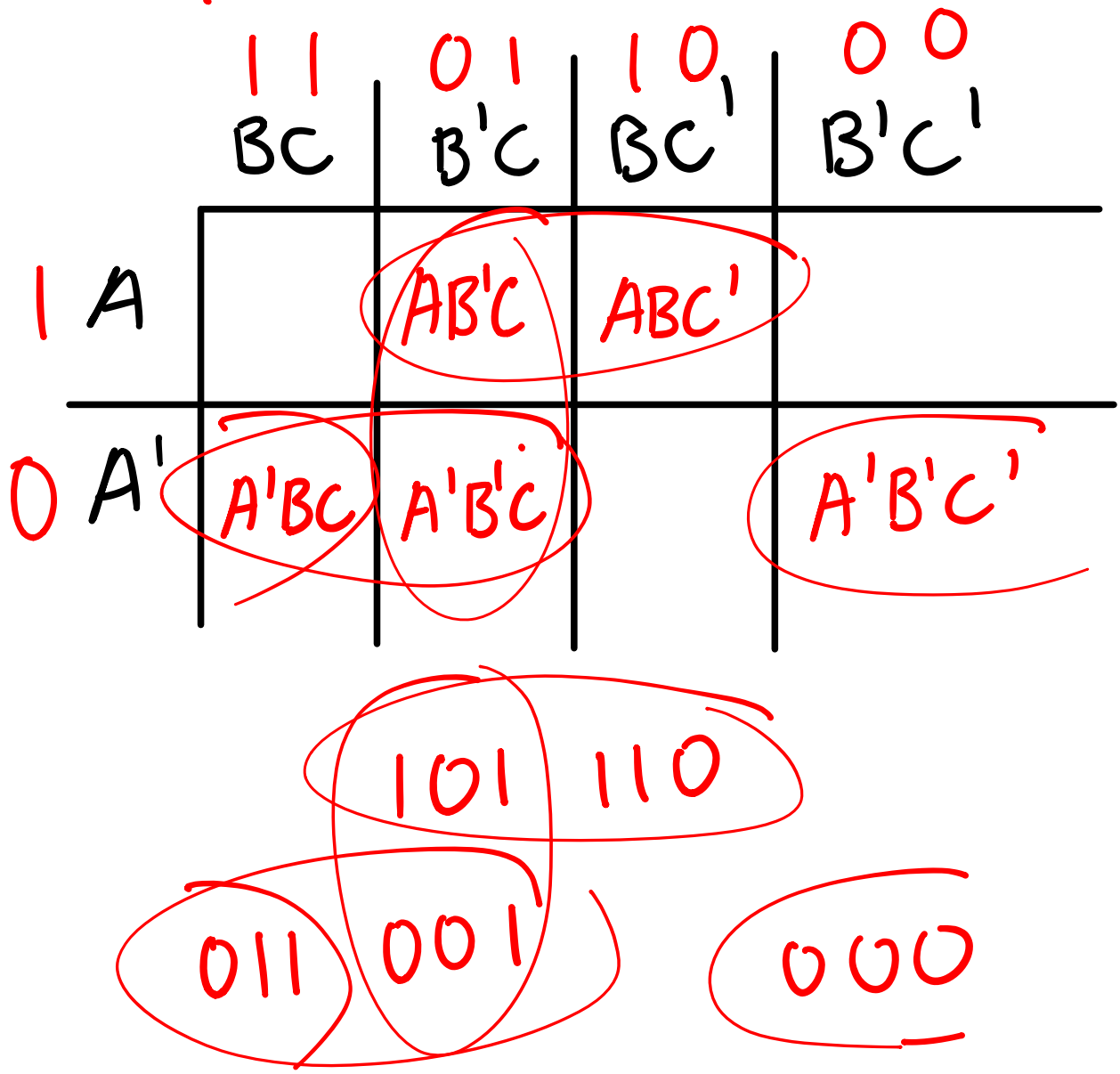
W2 Boolean Algebra

1.

$F = A'B'C' + A'B'C + A'BC + AB'C + ABC'$

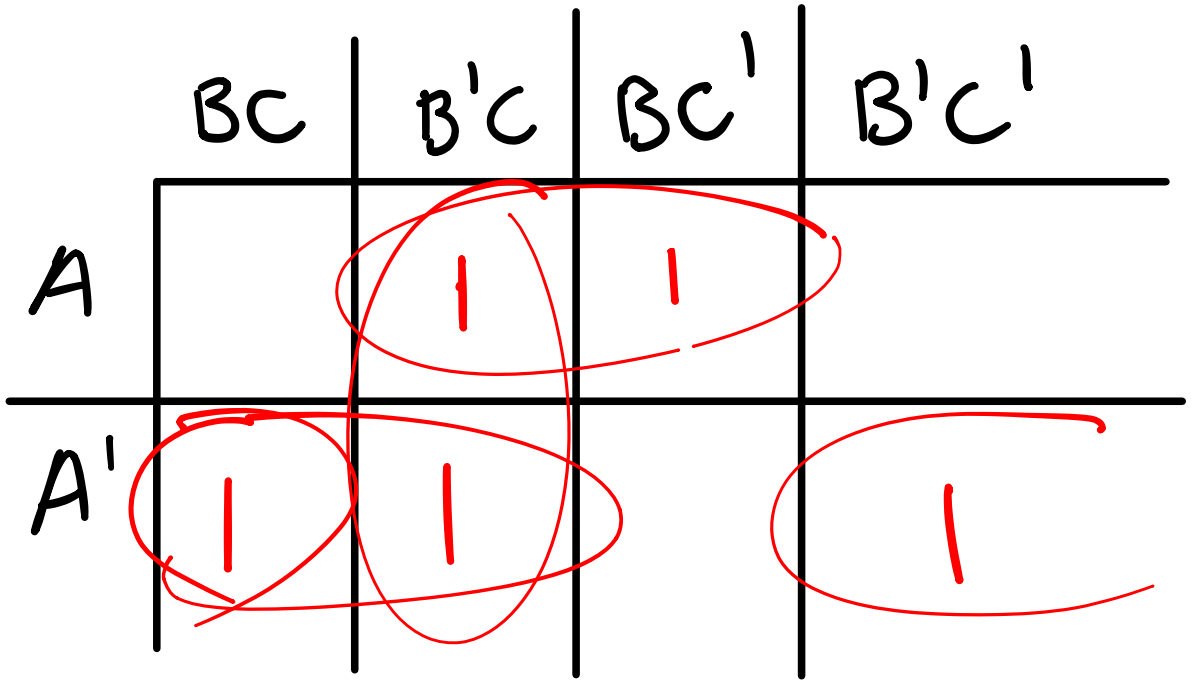


ab = a and b

a+b = a or b

NOT(a) = a'

a and not b = ab'



Make groups of 2, 4, or 8

Group 1 : $A'B'C + AB'C$

$B'C(A' + A) = B'C$

Group 2 : $AB'C + ABC'$

$A(B'C + BC')$

Group 3 : $A'BC + A'B'C'$

$A'(BC + B'C')$

Group 4 : $A'BC + A'B'C$ $A'C(B + B') = A'C$

$$F = B'C + A(B'C + BC') + A'(BC + B'C') + A'C$$

$$= B'C + ABC' + A'B' + A'C$$

Boolean Algebra

$$F = A'B'C' + A'B'C + A'BC + AB'C + ABC'$$

$$= A'B' + A'BC + AB'C + ABC'$$

$$= A'(BC + B') + AB'C + ABC'$$

$$= A'(B' + C) + AB'C + ABC'$$

$$= A'B' + A'C + AB'C + ABC'$$

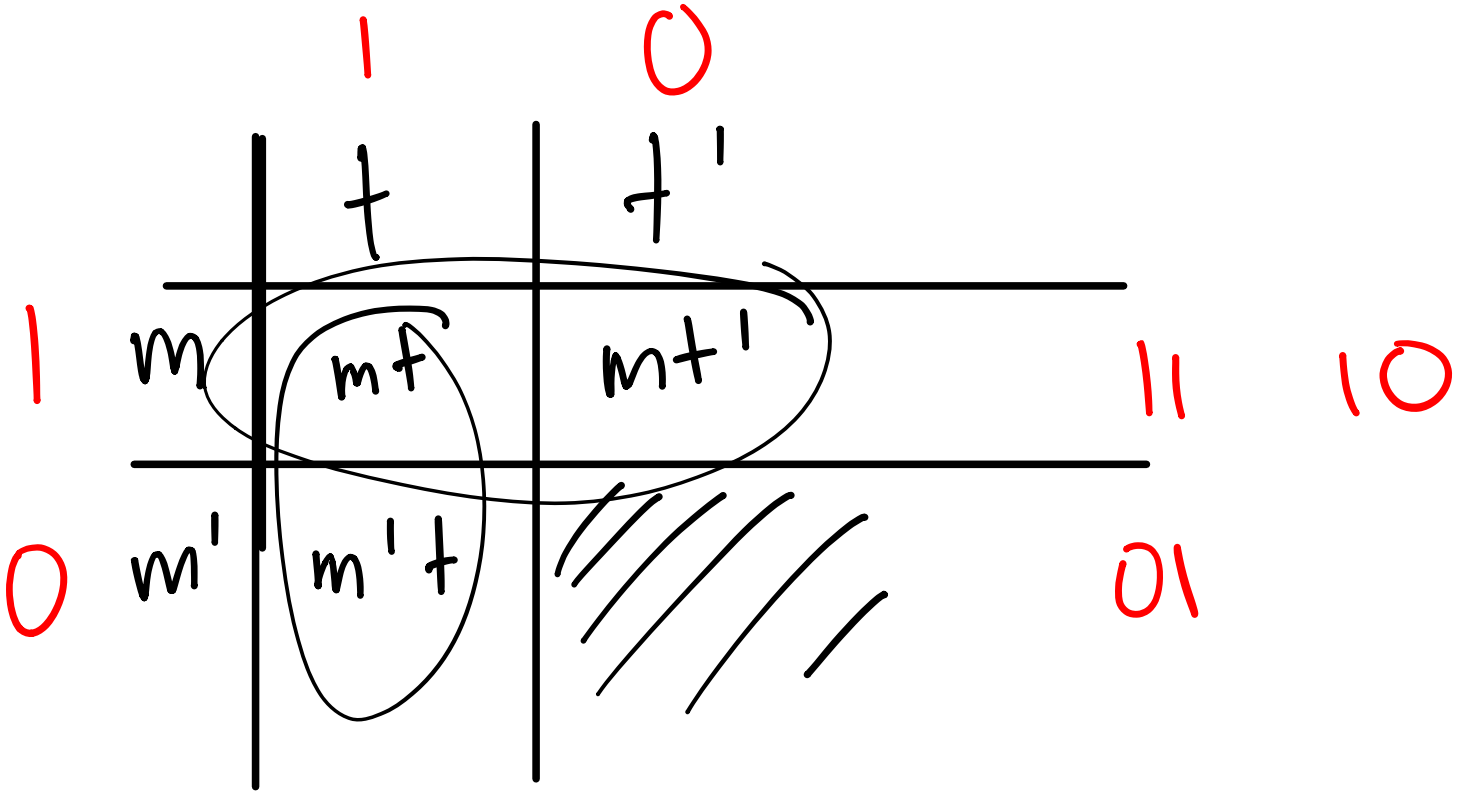
$$= A'B' + C(A' + AB') + ABC'$$

$$= A'B' + C(A' + B') + ABC'$$

$$F = A'B' + A'C + B'C + ABC'$$

2.

$$i = mt' + m't + mt$$



group 1: $m't + mt$

$$t(m' + m) = t \cdot 1 = t$$

group 2: $mt + mt'$

$$m(t + t') = m \cdot 1 = m$$

$$i = m + t$$ illuminate if motion sensed

or test mode on.

$$i = mt' + m't + mt$$

$$i = mt' + mt + m't$$

$$= m(t' + t) + m't$$

$$= m \cdot 1 + m't$$

$$i = m + m't$$

illuminate if motion sensed or motion not sensed but test mode on.

Problem 1 Flowchart

Problem 2 Flowchart

take original equation and create k-map

create groups of 2 in k-map

simplify groups using basic boolean algebra

rewrite into simplified equation

compare to second method of just simplifying using boolean algebra

Create an equation based on given info

Create k-map

groups of 2

simplify groups with boolean algebra

Compare kmap to second method of using boolean algebra

Interpret meaning of simplified equations

2. Challenges that appeared were trying to get the same simplified equations with the two different methods, and knowing what boolean algebra properties to apply. This made it a little hard to understand how to properly simplify in some scenarios.