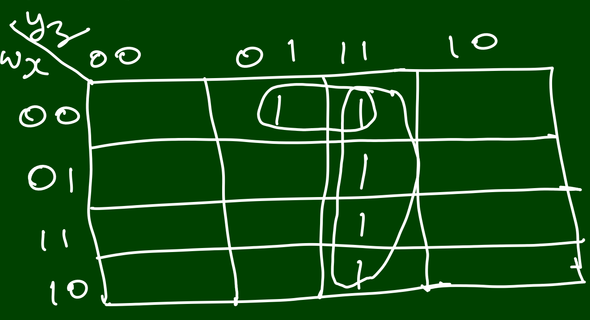
12/11/21 Friday

① Simplify the Boolean function

$F(w,x,y,z) = \Sigma(1,3,7,11,15)$

Sol:-



0001 - 1
0011 - 3
0111 - 7
1011 - 11
1111 - 15

$\therefore \boxed{F(w,x,y,z) = w'x'z + yz}$

Rough

Group 1 — (1,2), (1,3)

Group 2 — (1,3), (2,3), (3,3), (4,3)

0 0 1 1
0 1 1 1
1 1 1 1
1 0 1 1
x x y z

$w'x'z$

$\longrightarrow yz$

Verification $\boxed{w'x'z + yz}$ sop minterms

$w'x'(y+y')z + (w+w')yz$

$w'x'yz + w'x'y'z + wyz + w'yz$

$x \cdot 1 = x$
$x + x' = 1$
$x \cdot (y+z) = x \cdot y + x \cdot z$

$w'x'yz + w'x'y'z + w(x+x')yz + w'(x+x')yz$

$wxyz + wx'yz + w'xyz + w'x'yz$

$w'x'yz + w'x'y'z + wxyz + wx'yz + w'xyz$

0011 + 0001 + 1111 + 1011 + 0111

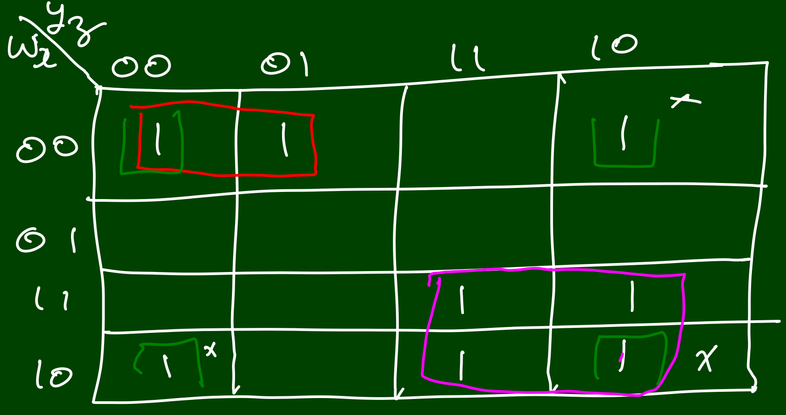
↓ ↓ ↓ ↓ ↓

3 1 15 11 7

$\Sigma(1,3,7,11,15)$

② Simplify $F(w,x,y,z) = \Sigma(0,1,2,8,10,11,14,15)$

Sol :- $F(w,x,y,z) = \Sigma(0,1,2,8,10,11,14,15)$



$w'x'y' + wy + x'z'$

(1,1) (1,2)

(3,3), (4,3)
(3,4), (4,4)

(1,1), (1,4)
(4,1), (4,4)

Red → $w'x'y'$
Pink → wy
Green → $x'z'$

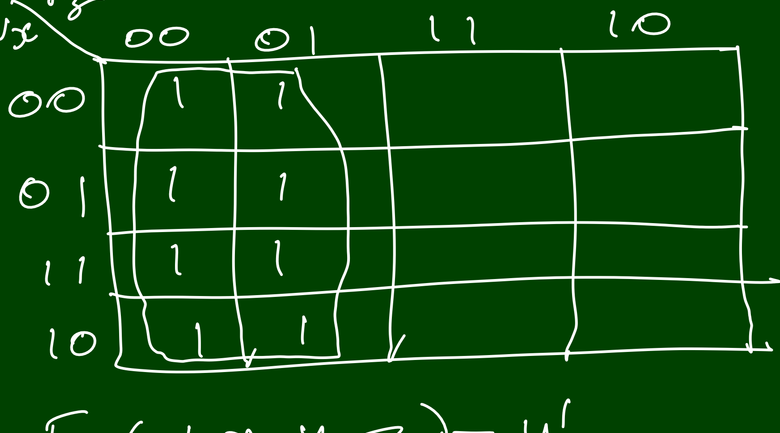
$\therefore F(w,x,y,z) = w'x'y' + wy + x'z'$

$2^0, 2^1, 2^2, 2^3, 2^4$

4	3	2	1

(3) Simplify $F(w,x,y,z) = \Sigma(0,1,4,5,8,9,12,13)$

Sol :- $F(w,x,y,z) = \Sigma(0,1,4,5,8,9,12,13)$



$F(w,x,y,z) = y'$

Rough (1,1)

Rough

(1,1), (1,4), (4,1), (4,4)

0 0 0 0
0 0 1 0
1 0 0 0
1 0 1 0

(1,1) → (1,4), (4,1)
(1,4) → (1,1), (4,4)
(4,1) → (1,1) (4,4)
(4,4) → (1,4), (4,1)