Homework #3

2.14 Implement the Boolean function

$$F = x'y' + x'z + xy$$

(a) With AND, OR, and inverter gates

(b)* With OR and inverter gates

2.20 Express the complement of the following functions in sum-of-minterms form:

(a) $F(A,B,C,D) = \Sigma(0, 3, 5, 7, 9, 11, 13)$

(b) $F(x, y, z) = \Pi(2, 4, 6, 8)$

3.3* Simplify the following Boolean expressions, using three-variable maps:

(a)* $F(x, y, z) = xyz + x'y + xyz'$ (b)* $F(x, y, z) = x'yz + xyz' + xyz + x'yz' + xy'z'$

3.5 Simplify the following Boolean functions, using four-variable maps:

(a)* $F(w, x, y, z) = \Sigma(0, 4, 6, 8, 14, 15)$

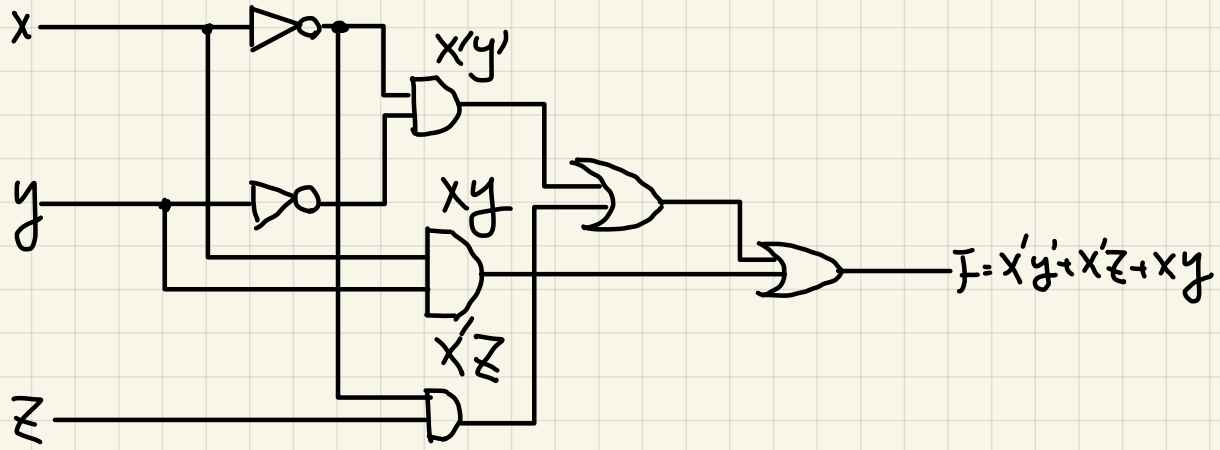
(b) $F(A, B, C, D) = \Sigma(2, 3, 6, 7, 12, 13, 14)$

3.7 Simplify the following Boolean expressions, using four-variable maps:

(a)* $w'z + xz + x'y + wx'z$

(b) $ACD' + B'C'D + BCD + BC'$

2.14(a)



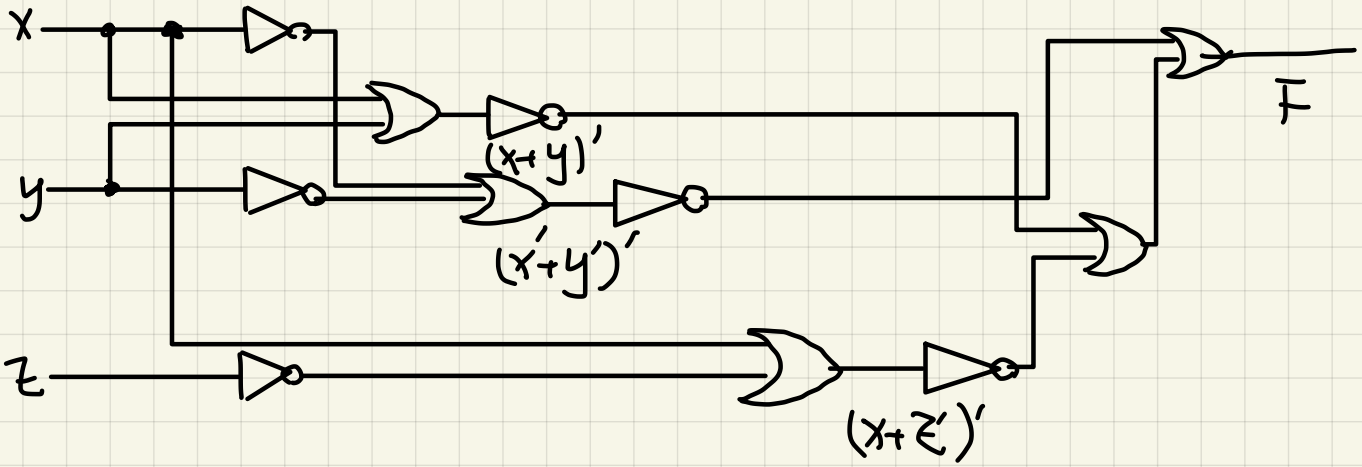
2.14(b)

We rewrite $x'y' = (x+y)'$

$x'z = (x+z')'$

$xy = (x'+y')'$.

$\Rightarrow F = ((x+y)') + ((x+z')') + ((x'+y')')$



2.20

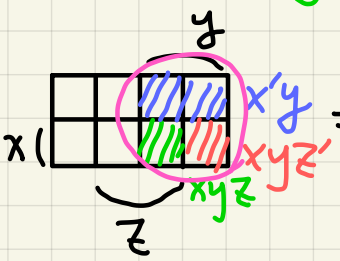
(a) $\bar{F}(A,B,C,D) = \sum(1,2,4,6,8,10,12,14,15) = m_1 + m_2 + m_4 + m_6 + m_8 + m_{10} + m_{12} + m_{14} + m_{15}$

(b) $\bar{F}(x,y,z) = \Pi(0,1,3,5)$

$= \sum(2,4,6,7)$

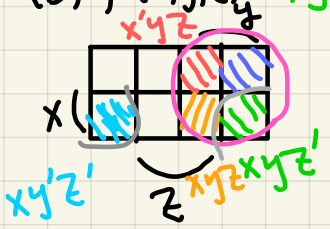
$= m_2 + m_4 + m_6 + m_7$

3.3 (a) $F(x,y,z) = xyz + x'y + xyz'$



$\Rightarrow F = y$

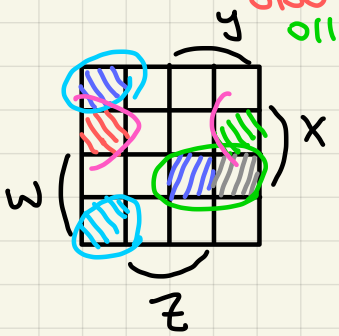
(b) $F(x,y,z) = x'yz + xyz' + xyz + x'yz' + xy'z'$



$F = y + xz'$

3.5 (a) $F = \Sigma(0, 4, 6, 8, 14, 15)$

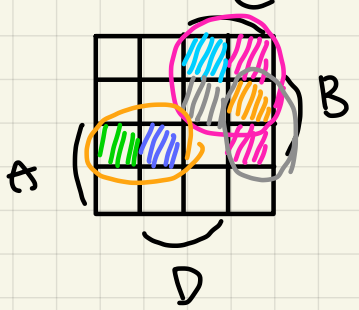
0000 0100 1000 1111
0110 1110



$F = w'xz' + wxy + x'y'z'$

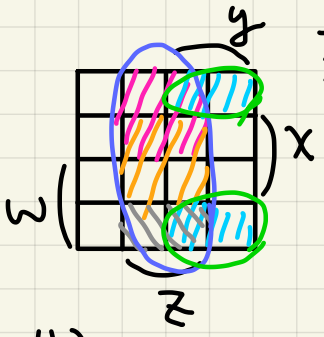
(b) $F = \Sigma(2, 3, 6, 7, 12, 13, 14)$

0010 0011 0111 1101
0110 1100 1110



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

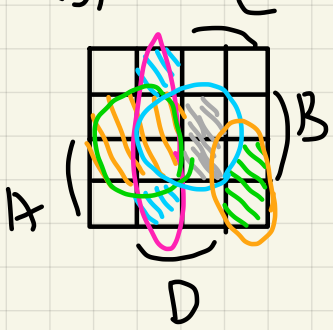
3.7(a)



$F = w'z + xz + x'y + wx'z$

$= z + x'y$ #

(b)



$F = ACD' + B'C'D + BCD + BC'$

$= C'D + BC' + BD + ACD'$