Assignment -2 Solution

1) $xyz' + x'yz + xyz + x'yz'$

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

$= xy + x'yz + x'yz'$

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

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

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

$= xy + yz + x'yz'$

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

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

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

$= xy + x'y + yz$

$= y(x+x') + yz$

$= y + yz$ (Absorption Law)

$=$ ■

$=$

$= y$

2) $(a'b + cd)e' + e$

$= [(a'+b)(c+d) + e'] \cdot e$

$= [(a+b')(c'+d') + e] \cdot e'$

3) $F(v, w, x, y, z) = $ ~~wxy~~ $wy + wx + x'y$

SOP

~~wy(v+v')(zx)~~

$F = wy(v+v')(x+x')(z+z') + wx(v+v')(y+y')(z+z') + x'y(v+v')(w+w')$
$(z+z')$

$= (vwy + v'wy)(xz + xz' + x'z + x'z') + (vwx + v'wx)(yz + yz' + y'z + y'z')$
$+ (vx'y + v'x'y)(wz + wz' + w'z + w'z')$

$= vwxyz + vwxyz' + vwx'yz + vwx'yz' + v'wxyz + v'wxyz' + v'wx'yz$
$+ v'wx'yz' + \underline{vwxyz} + vwxyz' + vwxy'z + vwxy'z' + v'wxyz +$
$v'wxyz' + v'wxy'z + v'wxy'z' + vwx'yz + vwx'yz' + vw'x'yz$
$+ vw'x'yz' + v'wx'yz + v'wx'yz' + v'w'x'yz + v'w'x'yz'$

$= vwxyz + vwxyz' + vwx'yz + vwx'yz' + v'wxyz + v'wxyz' + v'wx'yz$
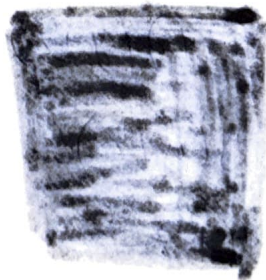$+ v'wx'yz' + vwxy'z + vwxy'z' + v'wxy'z + v'wxy'z' + vw'x'yz$
$+ vw'x'yz' + v'w'x'yz + v'w'x'yz'$

$=$ ~~00000~~, ~~00~~ 11111, 11110, 11011, 11010, 01111, 01110, 01011,
01010, 11101, 11100, 01101, 01100, 10011, 10010, 00011,
00010

$= \Sigma\left(\begin{array}{c} 31, 30, 27, 26, 15, 14, 11, 10, 29, 28, \\ 13, 12, 19, 18, 3, 2 \end{array}\right)$

$$F(\bullet, \bullet V, W, X, Y, Z) = WY + WX + XY'$$

$$= W(X+Y) + X'Y$$

$$= (W+X'Y)(X+Y+X'Y)$$

$$= (W+X')(W+Y)\underline{(X+Y+X')}(X+Y+Y)$$

$$= (W+X'+V\cdot V')(W+Y+V\cdot V')(X+Y+V\cdot V')$$

$$= (V+W+X')(V'+W+X')(V+W+Y)(V'+W+Y)(V+X+Y)(V'+X+Y)$$

$$= (V+W+X'+Y\cdot V')(V'+W+X'+Y\cdot Y')(V+W+Y+X\cdot X')(V'+W+Y+X\cdot X')$$
$$(V+X+Y+W\cdot W')(V'+X+Y+W\cdot W')$$

$$= (V+W+X'+Y)(V+W+X'+Y')(V'+W+X'+Y)(V'+W+X'+Y')(V+W+X+Y)$$
$$\cancel{(V+W+X'+Y)}(V'+W+X+Y)\cancel{(V'+W+X'+Y)}\cancel{(V+W'+X'+Y)}(V+W'+X+Y)$$
$$\cancel{(V'+W+X+Y)}(V'+W'+X+Y)$$

$$= (V+W+X'+Y+Z\cdot Z')(V+W+X'+Y'+Z\cdot Z')(V'+W+X'+Y+Z\cdot Z')(V'+W+X'+Y'+Z\cdot Z')$$
$$(V+W+X+Y+Z\cdot Z')(V'+W+X+Y+Z\cdot Z')(V+W'+X+Y+Z\cdot Z')(V'+W'+X+Y+Z\cdot Z')$$

$$= (V+W+X'+Y+Z)(V+W+X'+Y+Z')(V+W+X'+Y'+Z)(V+W+X'+Y'+Z')$$
$$(V'+W+X'+Y+Z)(V'+W+X'+Y'+Z)(V'+W+X'+Y'+Z')(V'+W+X'+Y+Z')$$
$$(V+W+X+Y+Z)(V+W+X+Y+Z')(V+W+X+Y+Z)(V+W+X+Y+Z')$$
$$(V+W'+X+Y+Z)(V+W'+X+Y+Z')(V'+W'+X+Y+Z)(V'+W'+X+Y+Z')$$

$$= (00100, 00101, 00110, 00111, 10100, 10101, 10110, 10111,$$
$$00000, 00001, 10000, 10001, 01000, 01001, 11000, 11001)$$

$$= \Pi(4, 5, 6, 7, 20, 21, 22, 23, 0, 1, 16, 17, 8, 9, 24, 25)$$

4) $F(A, B, C, D) = \left(ABCD + A'D' + (B'+D)'\right)'$ using NAND

ABCD

ABCD + A'D'

ABCD + A'D' + (B'+D)'

A'D'

B'

(B'+D)

(B'+D)'

$\left(ABCD + A'D' + (B'+D)'\right)'$