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 Digital logic  
 Design Home work 2  
 EE3702 (S04)  
 problems 2.3(f), 2.8, 2.19, 3.6(c), 3.21,  
 2/17/18

$$\begin{aligned}
 & 2.3(f) \text{ Simplify } (x' + z')(x + y' + z') \\
 & = x'x + y'x' + x'z' + zx + z'y' + z'z \\
 & = 0 + x'y' + x'z' + z'y' + z'z + xz \\
 & = z' + x'y' + z'y' \quad (\cancel{xz} + \cancel{x'y'} + \cancel{z'y'}) \\
 & \quad \cancel{z' + y'(x+z)} \quad (\cancel{z(xy)})(\cancel{z'y'}) \\
 & = \cancel{z(x+y)}(\cancel{z+y}) \\
 & = \cancel{z(xz+yz+yz+yy)} = xz + xy + yz \\
 & \quad \cancel{z(x+y+y)} \\
 & \quad \cancel{z'(1+y')} + x'y' \\
 & 2.8 F = wx + yz \\
 & F' = (wx + yz)' = (wx)'(yz)' \\
 & = (w' + x')(y' + z') = F'
 \end{aligned}$$

$$\begin{aligned}
 FF' &= (wx + yz)(w' + x')(y' + z') = (wx + yz)(w' + x')(y' + z') \\
 &\equiv \cancel{(wx + yz)(w'y' + w'z' + x'y' + x'z')} = 0 \quad \text{Per identity} \\
 &\equiv \cancel{(wx + yz)(w(y' + z') + x'(y' + z'))} \\
 &\equiv \cancel{wxw'(y' + z')} + \cancel{wxw'(y' + z')} + \cancel{yzw'(y' + z')} + \cancel{yzx'(y' + z')} \\
 &\equiv 0 + 0 + \cancel{yzw'} + \cancel{yzx'} + \cancel{yzx'w'}(y' + z')
 \end{aligned}$$

$$= \cancel{yy'z} + \cancel{yzz'} + \cancel{zxw}$$

$$= \cancel{zxw} + \cancel{yzz'} = \cancel{x'w'(z+y)}$$

$$P + P' = (wx + yz) + (wx + yz)' = 1 \text{ per identity}$$

2. 24

$$F(A, B, C, D) = B'D + A'D + BD$$

Sum of minterms:

$$P(A, B, C, D) = (A+A')B'(C+C')D + A'(B+B')(C+C')$$

$$+ \cancel{A''(A+A')B(C+C')D}$$

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

$$+ A'B'C'D + A'B'C'D + A'BC'D + A'B'C'D + A'BC'D + A'BC'D + A'BC'D$$

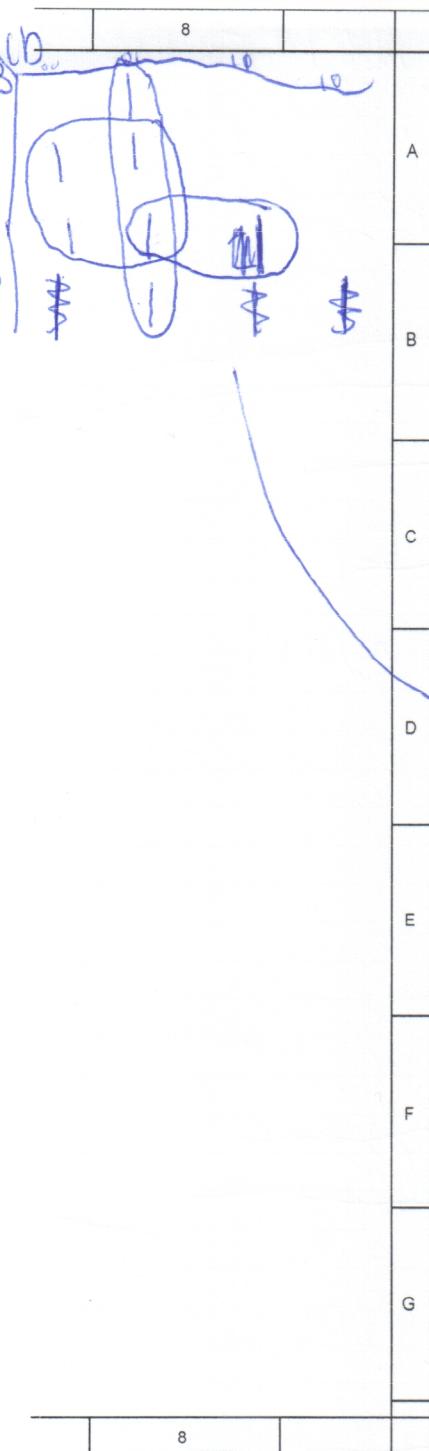
$$\cancel{SP + xw} = \cancel{8.5}$$

$$= \begin{matrix} 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{matrix} (B'C'D) + \begin{matrix} 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 \\ 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{matrix} (A'B'C'D) + \begin{matrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{matrix} (A'BC'D) + \begin{matrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{matrix} (A'B'C'D) + \begin{matrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \\ 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 0 \end{matrix} (A'BC'D)$$

$$+ ABCD + ABCD$$

$$\sum m(1, 3, 6, 7, 9, 11, 13, 15)$$

$$= \Pi M(0, 2, 4, 5, 8, 10, 12, 14)$$



3.6(c)  $A'B'C'D + AB'D + A'BC' + ABCD +$

Kmap

$$AB'C$$

$$\begin{array}{cccc} 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 \end{array}$$

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

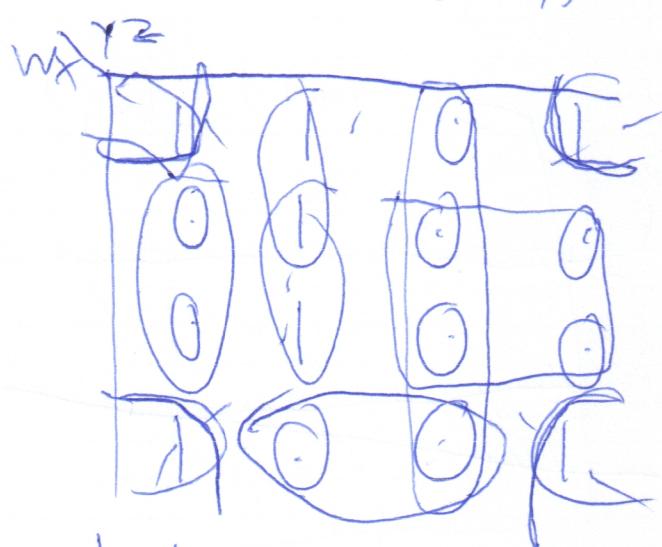
$$+ ABCD + AB'C(D+B')$$

$$\begin{array}{cc} 1 & 1 & 1 \\ 1 & 1 & 0 \\ 1 & 0 & 1 \end{array}$$

$\Sigma m(2, 4, 5, 9, 12, 13, 15)$

3.22  $\rightarrow F = C'D + BC' + ABD$

~~F~~  $F(w, x, y, z) = \Sigma m(0, 2, 5, 8, 20, 23)$



$$F = xy'z' + yz + xy + wx'z$$

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