

Heimadæmi03 Greining og Hönnun stýrikerfa TÖV201G

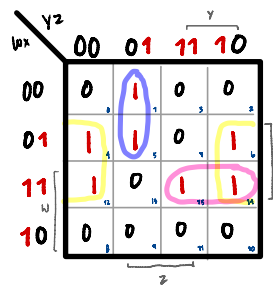
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3.5 Simplify the following Boolean functions using variable - Map

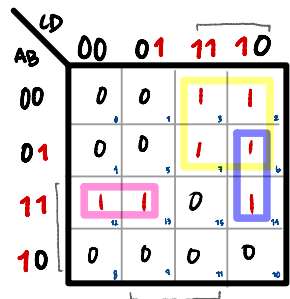
a) $F(w,x,y,z) = (1,4,5,6,12,14,15)$

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



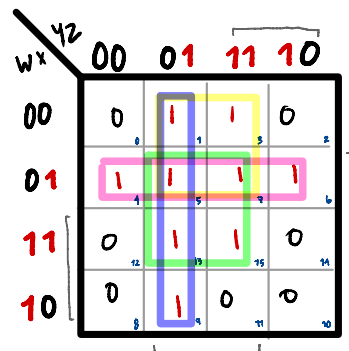
b) $F(A,B,C,D) = (2,3,6,7,12,13,14)$

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



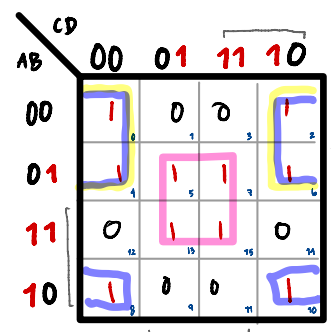
e) $F(w,x,y,z) = (1,3,4,5,6,7,9,11,13,15)$

$$F = A'D + C'D + A'B + BD$$



d) $F(A,B,C,D) = (0,2,4,5,6,7,8,10,13,15)$

$$F = A'D' + B'D + BD$$



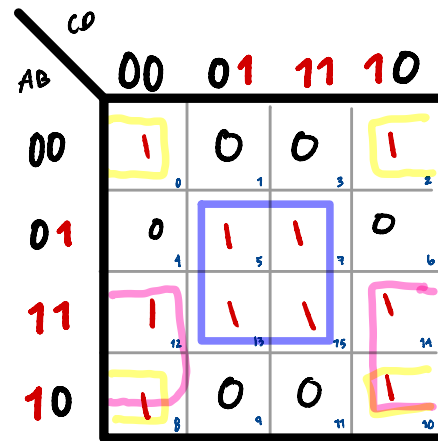
3.10 Simplify the following functions by first finding the essential prime implicants:

a) $F(w,x,y,z) = (0,2,5,7,8,10,12,13,14,15)$

Essentials;

- $B'D' = (0,2,8,10)$
- $BD = (5,7,13,15)$
- $AD' = (8,10,12,14)$

$$F = B'D' + BD + AD'$$

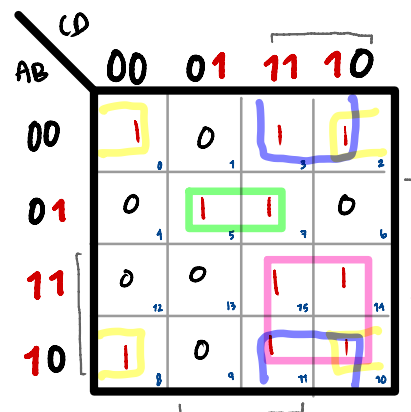


b) $F(A,B,C,D) = (0,2,3,5,7,8,10,11,14,15)$

Essentials;

- $B'D' = (0,2,8,10)$
- $B'C = (2,3,10,11)$
- $AC = (10,11,14,15)$
- $A'BD = (5,7)$

$$F = B'D' + B'C + AC + A'BD$$



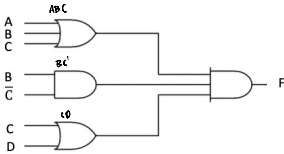
3.16 Simplify the following functions and implement them with two-level NAND gate circuits;

a) $F(A,B,C,D) = AC'D' + A'C + ABC + AB'C + A'C'D'$

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

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

3.A0 Convert the following logic to an equivalent NOR-NOR circuit



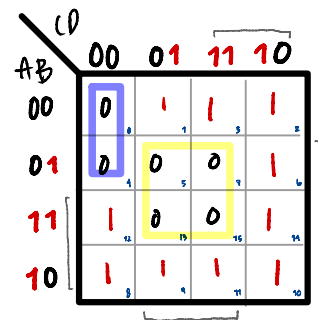
3.A1 Convert the following Boolean functions from a sum-of-product form to a simplified product-of-sum

i) $F(A,B,C,D) = (1,2,3,6,8,9,10,11,12,14)$

groups:

● $(5,7,13,15) = BD$
 ● $(0,4) = A'C'D'$

$$\begin{aligned} \text{Simplified POS} &= F' = B \cdot D + A'C'D' \\ &= \overline{B \cdot D + A'C'D'} \\ &= \underline{\underline{F = (B'D')(A+C+D)}} \end{aligned}$$



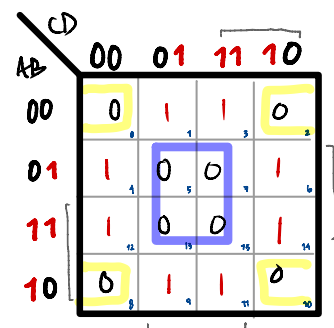
- Replace the AND operator to OR operator and vice versa.
- Simplify the resulting expression.

ii) $F(A,B,C,D) = (1,3,4,6,9,11,12,14)$

groups:

● $(0,2,8,10) = B'D'$
 ● $(5,7,13,15) = BD$

$$\begin{aligned} F' &= B'D' + BD \\ F &= BD + B'D' \\ &= \underline{\underline{F = (B+D)(B'+D')}} \end{aligned}$$



In []: