Lojik ifadeleri Karnaugh haritası ile sadeleştirme çözümleri

① $\boxed{AB + AB\bar{C} + ABC}$ standart çarpımların toplamına dönüştürelim

$AB = ABC + AB\bar{C} \Rightarrow \vartheta = ABC + AB\bar{C} + AB\bar{C} + ABC$

$= ABC + AB\bar{C} = AB(C + \bar{C}) = AB$ //

Karnaugh'a gerek kalmadı

② $ABC + A\bar{B}\bar{C} + AB\bar{C} + A\bar{B}C + \bar{A}\bar{B}\bar{C}$
$\ \ \ \ \ \ 111 \ \ \ \ \ 100 \ \ \ \ \ 110 \ \ \ \ \ 101 \ \ \ \ \ 000$
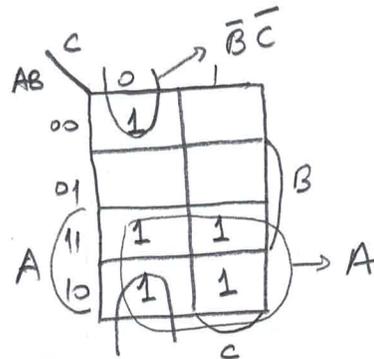
$\vartheta = A + \bar{B}\bar{C}$ //

③ $\bar{A}\bar{B}CD + \bar{A}B\bar{C}\bar{D} + AB\bar{C}D + ABCD + AB\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D + A\bar{B}C\bar{D}$
$\ \ \ 0011 \ \ \ \ \ 0100 \ \ \ \ 1101 \ \ \ 1111 \ \ \ \ 1100 \ \ \ \ 0001 \ \ \ \ 1010$
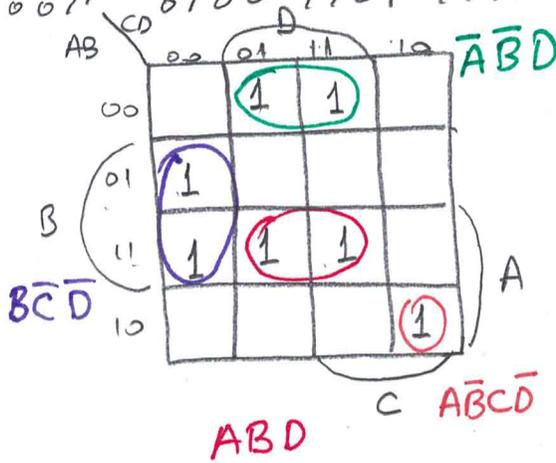
$\vartheta = ABD + \bar{A}\bar{B}D + B\bar{C}\bar{D} + A\bar{B}C\bar{D}$ //

④ $\bar{A}\bar{B}\bar{C} + \bar{A}\bar{B}C + A\bar{B}C$
$\ \ 000 \ \ \ \ \ 001 \ \ \ \ \ 101$

$\vartheta = \bar{A}\bar{B} + \bar{B}C$ //

-1-
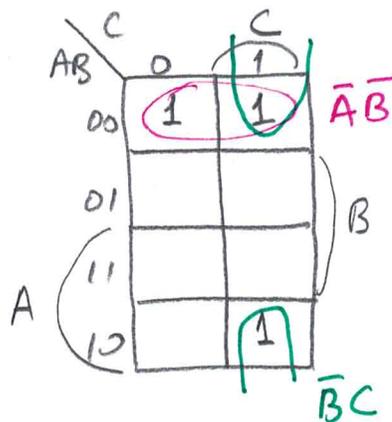
⑤ $\bar{A}\bar{B}C\bar{D} + \bar{A}\bar{B}\bar{C}D + ABCD + ABC\bar{D}$
   0 0 0 0   0 0 0 1   1 1 1 1   1 1 1 0

$\bar{A}\bar{B}\bar{C}$

ABC
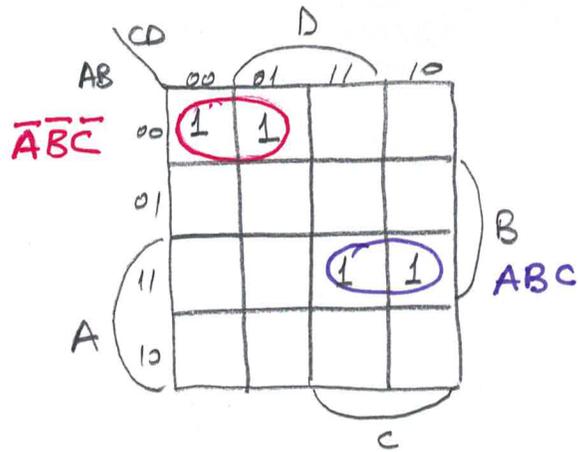
$Q = ABC + \bar{A}\bar{B}\bar{C}$

⑥ $\bar{A} + A\bar{B} + AB\bar{C}$
   0   1 0   1 1 0

$\bar{A}$' için A'nın sıfır olduğu tüm yerlere 1 konulur.

$Q = \bar{A} + \bar{B} + \bar{C}$

$\bar{C}$ $\bar{B}$
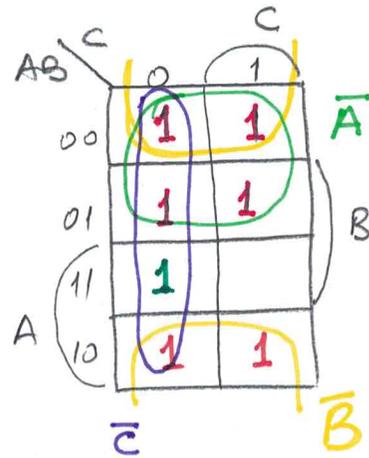
⑦ $A\bar{B}C + \bar{A}BCD + \bar{B}CD + \bar{A}\bar{C}D + AB\bar{C}D$
   1 0 1 x   0 1 1 1   x 0 1 1   0 x 0 1   1 1 1 1
   1 0 1 0   0 0 1 1   1 0 0 1
   1 0 1 1   1 0 1 1   1 1 0 1

CD

$AB\bar{C}$

$Q = AD + CD + A\bar{B}C$ //

AD

−2−
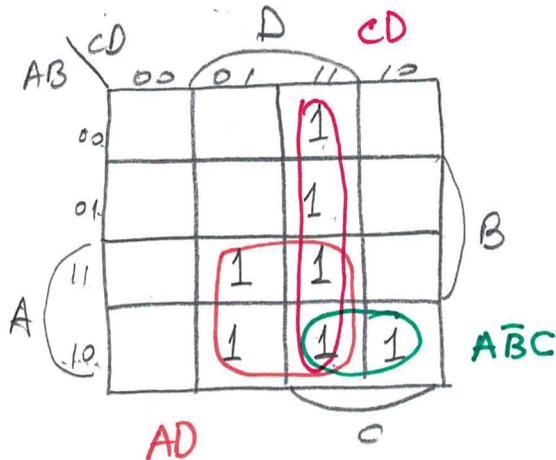
⑧ $A\overline{B}C + AB\overline{C} + \overline{A}B\overline{C} + \overline{A}\,\overline{B}\,\overline{C}$
   101   110   010   000
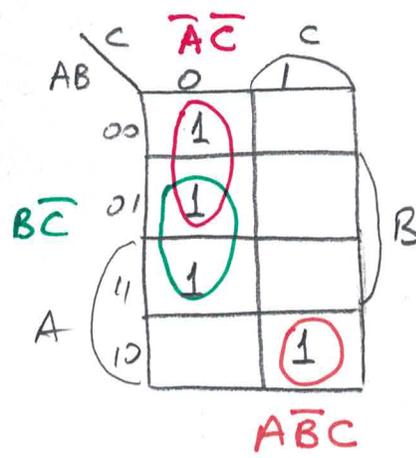
$\vartheta = \overline{A}\overline{C} + B\overline{C} + A\overline{B}C$

⑨ $A\overline{B}\overline{C}D + A\overline{B}\overline{C}\overline{D} + \overline{A}BCD + ABCD$
   1001   1000   0011   1111
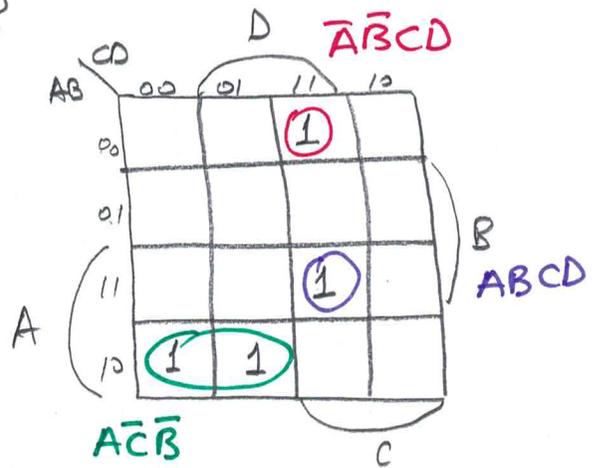
$\vartheta = A\overline{B}\overline{C} + ABCD + \overline{A}\overline{B}CD$

⑩ $A\overline{C}\,(\overline{B+C})\cdot\overline{B} = A\overline{C}\,(\overline{B}\cdot\overline{C})\cdot\overline{B} = A\overline{C}\overline{B}\cancel{\overline{C}}\overline{B} = A\overline{B}\overline{C}\,/\!/$

⑪ $(\overline{A} + ABC)(A + \overline{C}) = \underline{\overline{A}A} + \overline{A}\overline{C} + ABC\cancel{A} + ABC\underbrace{\overline{C}}_{0} = \overline{A}\overline{C} + ABC$
                                        0   0   1×0   111
                                                                           010
   000
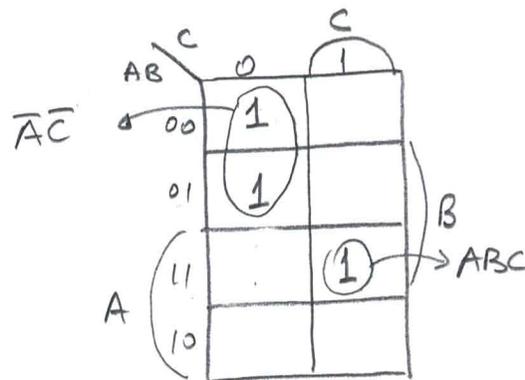
$\vartheta = \overline{A}\overline{C} + ABC \,/\!/$

(12) $AC + \overline{A}\,\overline{B}C + A\overline{B}$

$\underbrace{1x1}\quad\quad 001\quad\quad \underbrace{10x}$
$101\quad\quad\quad\quad\quad 100$
$110\quad\quad\quad\quad\quad 101$

$\varphi = A\overline{C} + \overline{B}C //$

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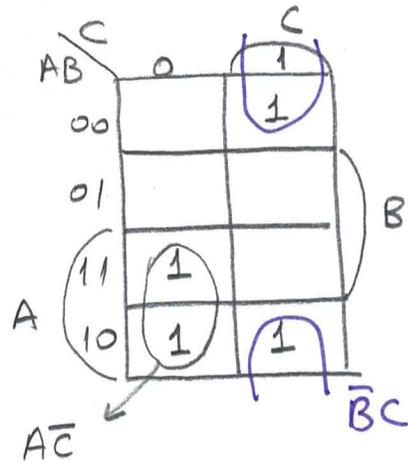
(13) $A\overline{B}\,\overline{C} + \overline{A}B\overline{C} + \overline{A}\overline{B}\overline{C} + \overline{A}\,\overline{B}C$

$100\quad 010\quad 010\quad 001$

$\varphi = A\overline{B}\,\overline{C} + \overline{A}B\overline{C} + \overline{A}\,\overline{B}C //$

(Aynısı çıktı)

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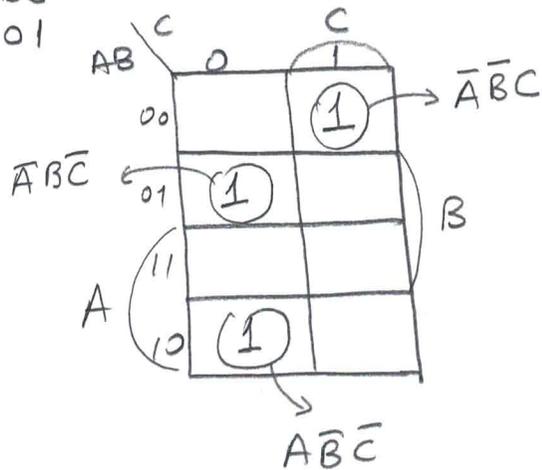
(14) $\overline{A} + \overline{A}BC + A\overline{C}D + (A\overline{B} + \overline{A}B)\overline{B}$

$= \overline{A} + \overline{A}BC + A\overline{C}D + \underbrace{A\overline{B}\,\overline{B}}_{A\overline{B}} + \underbrace{\overline{A}\cancel{B}\overline{B}}_{0}$

$= \overline{A} + A\overline{B} + \overline{A}BC + A\overline{C}D$

$\quad\quad\quad 0xxx\quad 10xx\quad 011x\quad 1x01$
$\quad\quad\quad\quad\quad\quad\quad\quad\quad 0110\quad 1001$
$\quad\quad\quad\quad\quad\quad\quad\quad\quad 0111\quad 1101$

$\varphi = \overline{A} + \overline{B} + \overline{C}D //$

-4-
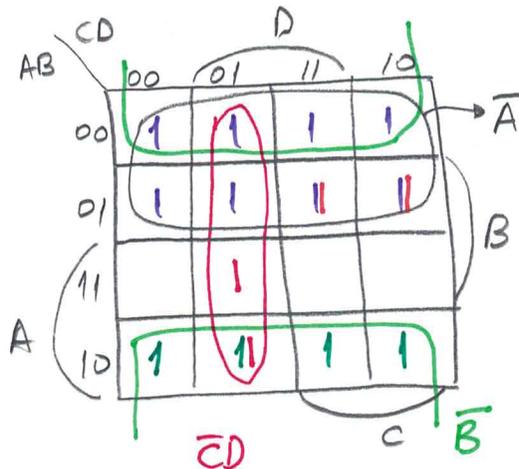
(15) $\overline{AC+B\overline{C}} \cdot \overline{A}\overline{B} \cdot A\overline{C}$ ifadeyi standart çarpımların toplamına

dönüştürelim.

$\overline{AC+B\overline{C}} \cdot \overline{A}\overline{B} A\overline{C}\}_0$

$= \overline{AC+B\overline{C}} \cdot \overline{0} = \overline{AC+B\overline{C}} = \overline{AC} \cdot \overline{B\overline{C}} = (\overline{A}+\overline{C}) \cdot (\overline{B} + \overline{\overline{C}})$

$= (\overline{A}+\overline{C})(\overline{B}+C)$

$= \overline{A}\overline{B} + \overline{A}C + \overline{B}\overline{C} + \overline{C}C$

ifade $= \overline{A}\overline{B} + \overline{A}C + \overline{B}\overline{C}$

$\begin{matrix} 0\,0\,x \\ 0\,0\,0 \\ 0\,0\,1 \end{matrix} \quad \begin{matrix} 0\,x\,1 \\ 0\,0\,1 \\ 0\,1\,1 \end{matrix} \quad \begin{matrix} x\,0\,0 \\ 0\,0\,0 \\ 1\,0\,0 \end{matrix}$

$\vartheta = \overline{A}C + \overline{B}\overline{C}$ //
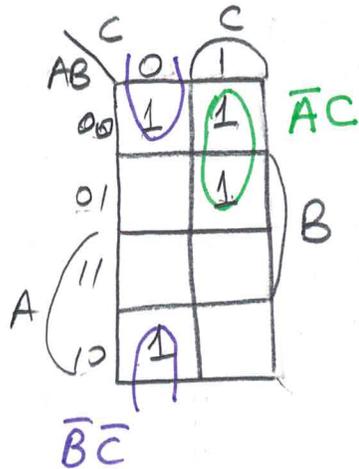
(16) $(\overline{AB}+\overline{A})(AB+A) = (\overline{A}+\overline{B}+\overline{A})(AB+A)$

$= (\overline{A}+\overline{B})(AB+A)$

$= \overline{A}AB + \overline{A}A + \overline{B}AB + \overline{B}A = A\overline{B}$ //

(17) $\overline{A}\overline{B} + \overline{A}B + A\overline{C} + ABC$

$\begin{matrix} 0\,0\,x \\ 0\,0\,1 \\ 0\,0\,0 \end{matrix} \quad \begin{matrix} 0\,1\,x \\ 0\,1\,0 \\ 0\,1\,1 \end{matrix} \quad \begin{matrix} 1\,x\,0 \\ 1\,0\,0 \\ 1\,1\,0 \end{matrix} \quad \begin{matrix} 1\,1\,1 \end{matrix}$

$\vartheta = \overline{A} + \overline{C} + B$ //

-5-
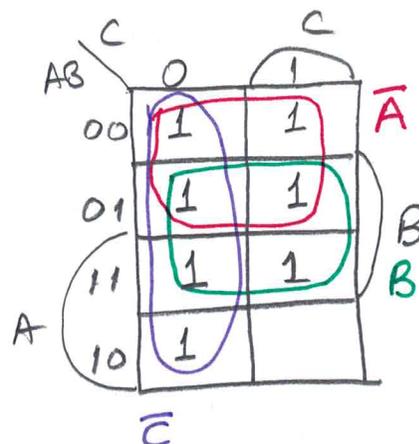
(18) $A + \overline{C}D + AC\overline{D} + \overline{A}BC\overline{D}$

1xxx xx01   1x10   0110

1010
1110

$Q = A + \overline{C}D + BC\overline{D} /\!/$
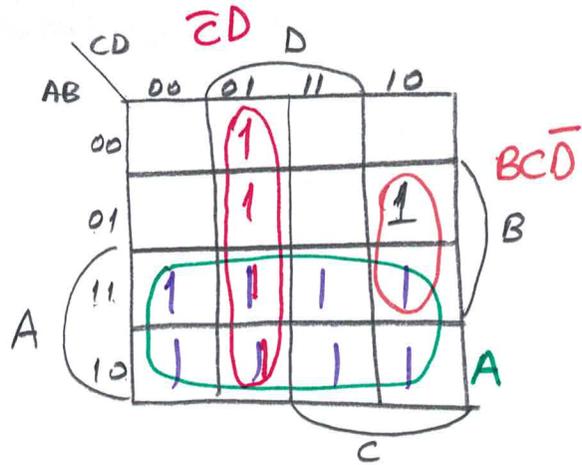
(19) $\overline{B}\overline{C} + A\overline{B} + AB\overline{C} + A\overline{B}C\overline{D} + \overline{A}B\overline{C}D + A\overline{B}C$

x00x   10xx   110x   ~~1010~~   ~~0001~~   101x

0000   ~~1000~~   1100   ~~1010~~
0001   ~~1001~~   1101   ~~1011~~
1000   1011
1001   1010
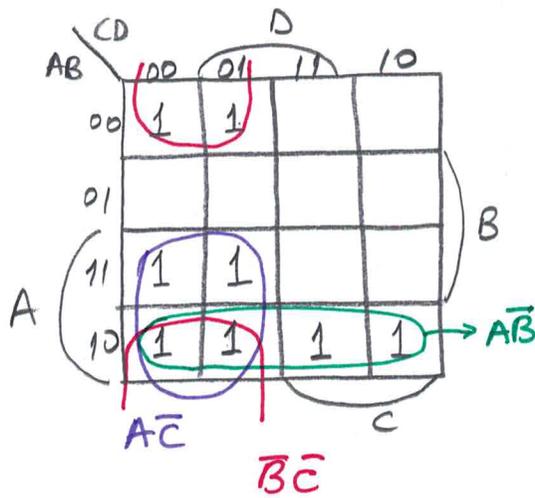
$Q = A\overline{B} + A\overline{C} + \overline{B}\overline{C} /\!/$

(20) $AC(\overline{B}+C) = A\overline{B}C + ACC = A\overline{B}C + AC$

101   1x1
~~101~~
110

$Q = A\overline{B}C + AB\overline{C} /\!/$

$-6-$
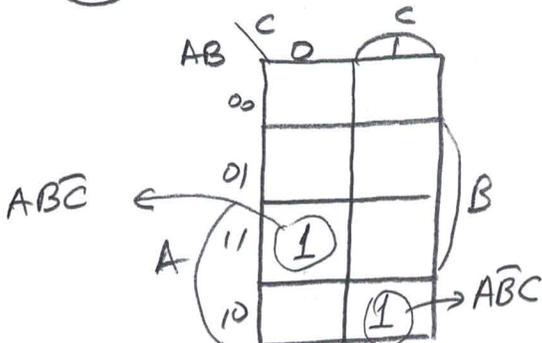
21

$A + B\bar{C} + C D$

$1xxx \quad x10x \quad xx11$

$\quad\quad\quad 0100 \quad\quad 0011$
$\quad\quad\quad 0101 \quad\quad 0111$
$\quad\quad\quad 1100 \quad\quad 1011$
$\quad\quad\quad 1101 \quad\quad 1111$
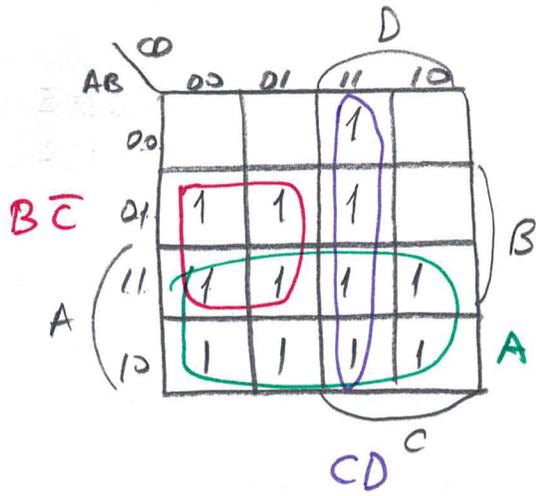
$\varphi = A + B\bar{C} + CD$ ☺

22

$\bar{A}\bar{B} + A\bar{B} + \bar{C}\bar{D} + C\bar{D}$

$00xx \quad 10xx \quad xx00 \quad xx10$
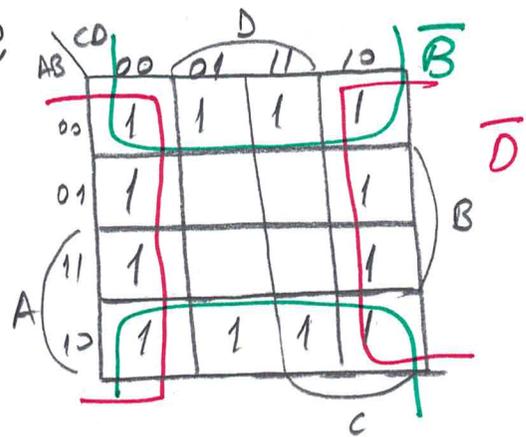
$\varphi = \bar{B} + \bar{D}$ //

23

$A\bar{B} + A\bar{B}\bar{C}D + CD + B\bar{C}D + ABCD$

$10xx \quad 1001 \quad xx11 \quad x101 \quad 1111$
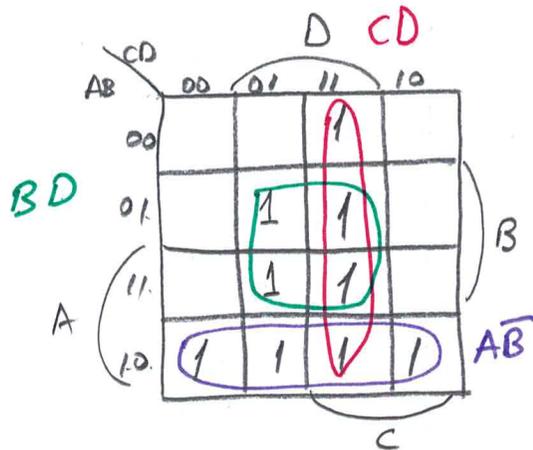
$\varphi = BD + CD + A\bar{B}$ //

24

$\bar{A}(BC + B\bar{C}) + A(BC + B\bar{C})$

$= (BC + B\bar{C})(A + \bar{A}) = BC + B\bar{C} = B(C + \bar{C}) = B$ //
$\quad\quad\quad\quad\quad\quad\;\; 1 \quad\quad\quad\quad\quad\quad\quad\quad\quad\quad 1$