

$$\textcircled{1} \quad \boxed{A + A\bar{A}}$$

$$A + \underbrace{A\bar{A}}_0 = A + 0 = A //$$

$$\textcircled{2} \quad \boxed{A + B + \bar{B}}$$

$$A + \underbrace{B + \bar{B}}_1 = A + 1 = 1 //$$

$$\textcircled{3} \quad \boxed{A + B\bar{B}}$$

$$A + \underbrace{B\bar{B}}_0 = A + 0 = A //$$

$$\textcircled{4} \quad \boxed{A\bar{B}\bar{B}}$$

$$A \underbrace{\bar{B}\bar{B}}_0 = A \cdot 0 = 0 //$$

$$\textcircled{5} \quad \boxed{A(B + \bar{B})}$$

$$A \underbrace{(B + \bar{B})}_1 = A \cdot 1 = A //$$

$$\textcircled{6} \quad \boxed{X + \bar{X}Y}$$

$$X + \bar{X}Y$$

$$= X \cdot 1 + \bar{X}Y$$

$$= X(1 + Y) + \bar{X}Y$$

$$= X + XY + \bar{X}Y$$

$$= X + Y \underbrace{(X + \bar{X})}_1$$

$$= X + Y$$

$$(X + \bar{X}Y) = X + Y \text{ (boolean kuralı)}$$

$$\textcircled{7} \quad \boxed{AB + \bar{A}\bar{B}C}$$

$$\underbrace{AB + \bar{A}\bar{B}C}_{X + \bar{X}Y}$$

$$X + \bar{X}Y = X + Y \rightarrow \text{boolean kuralı}$$

$$AB + C //$$

$$\textcircled{9} \quad \boxed{A + \overline{\bar{A}B}}$$

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

$$AB = A \underbrace{(1 + B)}_1$$

$$= A //$$

$$\textcircled{8} \quad \boxed{A + \overline{\bar{A}}}$$

$$A + \underbrace{\overline{\bar{A}}}_A = A + A = A //$$

$$\textcircled{10} \quad \boxed{\overline{\overline{A(B + \bar{B})}}}$$

$$\overline{\overline{A \underbrace{(B + \bar{B})}_1}}$$

$$= \overline{\overline{A \cdot 1}}$$

$$= \overline{\overline{A}}$$

$$= A //$$

$$\textcircled{11} \quad \boxed{A\bar{A} + B\bar{B}}$$

$$\underbrace{A\bar{A}}_0 + \underbrace{B\bar{B}}_0 = 0 + 0 = 0 //$$

$$\textcircled{12} \quad \boxed{(A + \bar{A}) \cdot B \cdot \bar{B}}$$

$$\underbrace{(A + \bar{A})}_1 \cdot \underbrace{B \cdot \bar{B}}_0$$

$$1 \cdot 0 = 0 //$$

$$\textcircled{13} \quad \boxed{A\bar{A} + AA + BB}$$

$$\underbrace{A\bar{A}}_0 + \underbrace{AA}_A + \underbrace{BB}_B$$

$$0 + A + B = A + B //$$

$$\textcircled{14} \quad \boxed{A\bar{A} + AA + B\bar{B}}$$

$$\underbrace{A\bar{A}}_0 + \underbrace{AA}_A + \underbrace{B\bar{B}}_0$$

$$0 + A + 0 = A //$$

$$(15) \quad C\bar{C} + (A+\bar{A}) + (B+\bar{B}) + D$$

$$\underbrace{C\bar{C}}_0 + \underbrace{(A+\bar{A})}_1 + \underbrace{(B+\bar{B})}_1 + D$$

$$0 + 1 + 1 + D = 1 //$$

$$(16) \quad ABC + \overline{ABC}D$$

$$\underbrace{ABC}_x + \underbrace{\overline{ABC}}_{\bar{x}} \underbrace{D}_y$$

$$\frac{x + \bar{x}y = x + y}{\text{boolean kuralı}}$$

$$= ABC + D //$$

$$(17) \quad ABC\bar{B}D$$

$$ABC\bar{B}D = A\bar{C}\underbrace{B\bar{B}}_0 \cdot D$$

$$= A\bar{C} \cdot 0 \cdot D = 0 //$$

$$(18) \quad AB + \overline{AB}CD + ABCD$$

$$\underbrace{AB}_x + \underbrace{\overline{AB}}_{\bar{x}} \underbrace{CD}_y + ABCD$$

$$x + \bar{x}y = x + y \quad \text{boolean kuralı}$$

$$AB + CD + \underbrace{AB\overline{CC}}_0$$

$$= AB + CD //$$

$$(19) \quad C + BC$$

$$C + BC$$

$$C(1+B) = C \cdot 1 = C //$$

$$(20) \quad A(A+B)$$

$$A(A+B) = \underbrace{AA}_A + AB$$

$$= A + AB$$

$$= A(1+B)$$

$$= A \cdot 1 = A //$$

$$(21) \quad \overline{A+B}$$

$$\overline{A+B}$$

$$= \bar{A} \cdot \bar{B} //$$

$$(\text{de-morgan kuralı})$$

$$(22) \quad \overline{AB}$$

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

$$(\text{de-morgan kuralı})$$

$$(23) \quad \overline{A+BC}$$

$$\overline{A+BC}$$

$$\bar{A} \cdot \overline{BC}$$

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

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

$$(24) \quad A(\bar{A} + \bar{B})$$

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

$$\underbrace{A\bar{A}}_0 + A\bar{B}$$

$$0 + A\bar{B}$$

$$= A\bar{B} //$$

$$(25) \quad D + \overline{CD}$$

$$D + \overline{CD}$$

$$= D + \bar{C} + \bar{D}$$

$$= \underbrace{D + \bar{D}}_1 + \bar{C}$$

$$= 1 + \bar{C}$$

$$= 1 //$$

26) $A(A+C)$

$$\begin{aligned} & A(A+C) \\ &= AA + AC \\ &= \underbrace{A}_A + AC \\ &= A(1+C) \\ &= A \cdot 1 = A // \end{aligned}$$

27) $A+AB$

$$\begin{aligned} & A+AB \\ &= A(\underbrace{1+B}_1) \\ &= A \cdot 1 \\ &= A // \end{aligned}$$

28) $A+\bar{A}B$

$$\begin{aligned} & A+\bar{A}B \\ &= A+B \quad \begin{array}{l} x+\bar{x}y=x+y \\ \text{De Morgan} \\ \text{kurah} \end{array} \\ & \quad \text{veya} \\ &= A \cdot 1 + \bar{A}B \\ &= A(1+B) + \bar{A}B \\ &= A+AB+\bar{A}B \\ &= A+B(\underbrace{A+\bar{A}}_1) = A+B // \end{aligned}$$

29) $A(\bar{A}+B)$

$$\begin{aligned} & A(\bar{A}+B) \\ &= \underbrace{A\bar{A}}_0 + AB \\ &= 0+AB \\ &= AB // \end{aligned}$$

30) $A+\bar{A}\bar{B}$

$$\begin{aligned} & \underbrace{A}_x + \underbrace{\bar{A}}_{\bar{x}} \underbrace{\bar{B}}_y \\ & x+\bar{x}y = x+y \quad \begin{array}{l} \text{boolean} \\ \text{kurah} \end{array} \\ &= A+\bar{B} // \end{aligned}$$

31) $A+\bar{A}\bar{B}\bar{C}$

$$\begin{aligned} & \underbrace{A}_x + \underbrace{\bar{A}}_{\bar{x}} \underbrace{\bar{B}}_{\bar{y}} \underbrace{\bar{C}}_z \\ & x+\bar{x}y = x+y \quad \begin{array}{l} \text{boolean} \\ \text{kurah} \end{array} \\ &= A+\bar{B}\bar{C} // \end{aligned}$$

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

$$\begin{aligned} & AB + \overline{(A+B)} \\ &= AB + \bar{A}\bar{B} // \end{aligned}$$

33) $C+\bar{B}\bar{C}$

$$\begin{aligned} & C+\bar{B}\bar{C} \\ &= C+\bar{B}+\bar{C} \\ &= \underbrace{C+\bar{C}}_1 + \bar{B} \\ &= 1+\bar{B} = 1 // \end{aligned}$$

34) $\bar{A}\bar{B} + AB + C$

$$\begin{aligned} & \bar{A}\bar{B} + AB + C \\ &= A(\bar{B}+B) + C \\ &= A \cdot 1 + C // \end{aligned}$$

35) $(X+Z)(XY)$

$$\begin{aligned} & (X+Z)XY \\ &= \underbrace{X}_x \underbrace{X}_x Y + ZXY \\ &= XY + ZXY \\ &= XY(\underbrace{1+Z}_1) \\ &= XY // \end{aligned}$$

36) $A+\bar{A}B+AB$

$$\begin{aligned} & A+\bar{A}B+AB \\ & \quad \underbrace{x+\bar{x}y=x+y}_{\text{boolean kurah}} \\ &= A+B+AB \\ &= A(1+B)+B \\ &= A+B // \\ & \quad \text{elbilen som} \end{aligned}$$

37) $A+AB+A\bar{B}C$

$$\begin{aligned} & A+AB+A\bar{B}C \\ &= A(1+B+\bar{B}C) \\ &= A \cdot 1 \\ &= A // \end{aligned}$$

$$\textcircled{38} \quad \boxed{A\bar{C} + A\bar{B}\bar{C}}$$

$$\begin{aligned} & A\bar{C} + A\bar{B}\bar{C} \\ &= A\bar{C} + A\bar{C}B \\ &= A\bar{C}(1+B) \\ &= A\bar{C} // \end{aligned}$$

$$\textcircled{39} \quad \boxed{(A+B)(A+C)}$$

$$\begin{aligned} & (A+B)(A+C) \\ &= AA + AC + BA + BC \\ &= A + AC + AB + BC \\ &= A(1+C+B) + BC \\ &= A \cdot 1 + BC = A + BC // \end{aligned}$$

$$\textcircled{40} \quad \boxed{\bar{A}BC + \bar{A}}$$

$$\begin{aligned} & \bar{A}BC + \bar{A} \\ &= \bar{A}(BC+1) \\ &= \bar{A} \cdot 1 \\ &= \bar{A} // \end{aligned}$$

$$\textcircled{41} \quad \boxed{A\bar{B}D + A\bar{B}\bar{D}}$$

$$\begin{aligned} & A\bar{B}D + A\bar{B}\bar{D} \\ &= A\bar{B}(D+\bar{D}) \\ &= A\bar{B} // \end{aligned}$$

$$\textcircled{42} \quad \boxed{(\bar{A}+B)(A+B)}$$

$$\begin{aligned} & (\bar{A}+B)(A+B) \\ &= \bar{A}A + \bar{A}B + BA + BB \\ &= 0 + \bar{A}B + BA + B \\ &= \bar{A}B + BA + B \\ &= B(\bar{A}+A+1) \\ &= B \cdot 1 = B // \end{aligned}$$

$$\textcircled{43} \quad \boxed{A(B+CD)}$$

$$\begin{aligned} & A(B+CD) \\ &= AB + ACD // \end{aligned}$$

$$\textcircled{44} \quad \boxed{AB + \bar{A}C + \bar{B}A}$$

$$\begin{aligned} & AB + \bar{A}C + \bar{B}A \\ &= AB + \bar{B}A + \bar{A}C \\ &= A(B+\bar{B}) + \bar{A}C \\ &= A + \bar{A}C \quad (x + \bar{x}y = x + y) \\ &= A + C // \quad \text{boolean kurati} \end{aligned}$$

$$\textcircled{46} \quad \boxed{A+B(A+C)+AC}$$

$$\begin{aligned} & A+B(A+C)+AC \\ &= A + BA + BC + AC \\ &= A(1+B+C) + BC \\ &= A + BC // \end{aligned}$$

$$\textcircled{45} \quad \boxed{A(\bar{A}+B) + A\bar{B}}$$

$$\begin{aligned} & A(\bar{A}+B) + A\bar{B} \\ &= A\bar{A} + AB + A\bar{B} \\ &= 0 + AB + A\bar{B} \\ &= A(B+\bar{B}) \\ &= A // \end{aligned}$$

$$\textcircled{47} \quad \boxed{AB + ABC}$$

$$\begin{aligned} & AB + ABC \\ &= AB(1+C) \\ &= AB // \end{aligned}$$

$$\textcircled{48} \quad \boxed{A + \bar{A}\bar{B}C + BC\bar{D}}$$

$$\begin{aligned} & A + \bar{A}\bar{B}C + BC\bar{D} \\ &= A + \bar{B}C + BC\bar{D} \\ &= A + C(\bar{B} + B\bar{D}) \\ &= A + C(\bar{B} + \bar{D}) \\ &= A + \bar{B}C + C\bar{D} // \end{aligned}$$

$x + \bar{x}y = x + y$ boolean kurati

49 $\boxed{AB+BC(B+C)}$
 $AB+BC(B+C)$
 $=AB+BC\cancel{B}+BC\cancel{C}$
 $=AB+\underbrace{BC+BC}_{BC}$
 $=AB+BC //$
 veya $=A(B+C) //$

50 $\boxed{\overline{(A+B) \cdot C}}$
 $\overline{(A+B) \cdot C}$
 $=\overline{A+B} + \overline{C}$
 $=\overline{A} \overline{B} + \overline{C} //$

51 $\boxed{\overline{A+B+C}}$
 $\overline{A+B+C}$
 $=\overline{A} \overline{B} \overline{C} //$ (de-morgan)

52 $\boxed{\overline{A} \overline{B} \overline{C} + \overline{A} \overline{B} C + A \overline{B} \overline{C} + A \overline{B} C}$
 $\overline{A} \overline{B} \overline{C} + \overline{A} \overline{B} C + A \overline{B} \overline{C} + A \overline{B} C$
 $=\overline{A} \overline{B} (\underbrace{\overline{C} + C}_1) + A \overline{B} (\underbrace{B + \overline{B}}_1)$
 $=\overline{A} \overline{B} + A \overline{B} //$

53 $\boxed{A + \overline{A} B + \overline{A} C + CD}$
 $\underbrace{A}_x + \underbrace{\overline{A} B}_x y + \overline{A} C + CD$
 $x + \overline{x} y = x + y$ boolean kuralı
 $= A + B + \overline{A} C + CD$
 $= \underbrace{A}_x + \underbrace{\overline{A} C}_x y + B + CD$
 $= A + C + B + CD //$

54 $\boxed{\overline{A} \overline{B} C + \overline{A} B C + A \overline{B}}$
 $\overline{A} \overline{B} C + \overline{A} B C + A \overline{B}$
 $= \overline{A} C (\underbrace{\overline{B} + B}_1) + A \overline{B}$
 $= \overline{A} C + A \overline{B} //$

55 $\boxed{(\overline{A} + B)(A + C)(B + C)}$

~~$(\overline{A} + \overline{A} C + AB + BC)(B + C)$~~
 0
 $(\overline{A} B C + \overline{A} C C + A B B + A B C + B B C + B C C)$
 $(\overline{A} B C + \overline{A} C + A B + A B C + B C + B C)$
 $\overline{A} C (\underbrace{B+1}_1) + A B (\underbrace{1+C}_1) + B C$
 $\overline{A} C + A B + B C$

56 $\boxed{\overline{A} B + B C + A C}$
 $\overline{A} B + B C + A C$
 $= \overline{A} B C + \overline{A} B \overline{C} + A B C + \overline{A} B C + \cancel{A B C} + A \overline{B} C$
 (standart çarpımların toplama)
 $= \overline{A} B C + \overline{A} B \overline{C} + A B C + A \overline{B} C$
 $= \overline{A} B (\underbrace{C + \overline{C}}_1) + A C (\underbrace{B + \overline{B}}_1)$
 $= \overline{A} B + A C //$

~~$= A B (1 + C)$~~
 ~~$= A B + B C$~~

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$(\overline{A} + B)(A B + A C + B C + C C)$
 $(\overline{A} + B)(A B + C(A + B + 1))$
 $(\overline{A} + B)(A B + C)$
 ~~$(\overline{A} A B + \overline{A} A C + A B B + B C)$~~
 0
 $\overline{A} C + A B + B C$

$$\textcircled{57} \quad \boxed{\bar{A}B + A + AB}$$

$$\begin{aligned} & \bar{A}B + A + AB \\ &= \bar{A}B + A \underbrace{(1+B)}_1 \\ &= \bar{A}B + A = A + \bar{A}B \end{aligned}$$

$$x + \bar{x}y = x + y \quad \text{boolean kuralı}$$

$$= A + B //$$

$$\textcircled{58} \quad \boxed{AB + \bar{A}B + \bar{A}\bar{B}}$$

$$\begin{aligned} & AB + \bar{A}B + \bar{A}\bar{B} \\ &= B \underbrace{(A + \bar{A})}_1 + \bar{A}\bar{B} \\ &= \underbrace{B}_x + \underbrace{\bar{B}}_x \underbrace{\bar{A}}_y \end{aligned}$$

$$x + \bar{x}y = x + y \quad \text{boolean kuralı}$$

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

$$\textcircled{59} \quad \boxed{AB + \bar{A}\bar{B} + \bar{A}C + \bar{A}\bar{C}}$$

$$\begin{aligned} & AB + \bar{A}\bar{B} + \bar{A}C + \bar{A}\bar{C} \\ &= A \underbrace{(B + \bar{B})}_1 + \bar{A} \underbrace{(C + \bar{C})}_1 \end{aligned}$$

$$= A + \bar{A}$$

$$= 1 //$$

$$\textcircled{60} \quad \boxed{AB + AB\bar{C} + A\bar{B}\bar{C} + ABC}$$

$$\begin{aligned} & AB + AB\bar{C} + A\bar{B}\bar{C} + ABC \\ &= AB + AB\bar{C} + ABC \end{aligned}$$

$$= AB \underbrace{(1 + \bar{C} + C)}_1$$

$$= AB //$$

$$\textcircled{61} \quad \boxed{AB(A+B)(B+B)}$$

$$\begin{aligned} & AB(A+B) \underbrace{(B+B)}_B \\ &= AB(A+B) \cdot B \\ &= A \underbrace{B}_B (A+B) \end{aligned}$$

$$= AB(A+B)$$

$$= A\bar{B} + AB\bar{B}$$

$$= AB + AB = AB //$$

$$\textcircled{62} \quad \boxed{AB + BC + AC}$$

$$AB + BC + AC$$

Daha fazla sadeleşmez.

$$\textcircled{64} \quad \boxed{A\bar{C} + AB\bar{C}}$$

$$\begin{aligned} & A\bar{C} + AB\bar{C} \\ &= A\bar{C} \underbrace{(1+B)}_1 \end{aligned}$$

$$= A\bar{C} //$$

$$\textcircled{63} \quad \boxed{ABC + AB\bar{C} + \bar{A}B\bar{C}}$$

$$\begin{aligned} & ABC + AB\bar{C} + \bar{A}B\bar{C} \\ &= AB \underbrace{(C + \bar{C})}_1 + \bar{A}B\bar{C} \end{aligned}$$

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

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

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

$$= AB + B\bar{C} //$$

$$x + \bar{x}y = x + y \quad \text{boolean kuralı}$$

$$\textcircled{65} \quad \boxed{A\bar{B}D + A\bar{B}\bar{D}}$$

$$\begin{aligned} & A\bar{B}D + A\bar{B}\bar{D} \\ &= A\bar{B}(D + \bar{D}) \\ &= A\bar{B} // \end{aligned}$$

$$\textcircled{68} \quad \boxed{ABC + A(\bar{B} + \bar{C})}$$

$$\begin{aligned} & ABC + A(\bar{B} + \bar{C}) \\ &= ABC + A\bar{B} + A\bar{C} \\ &= A(BC + \bar{B}) + A\bar{C} \end{aligned}$$

$$\textcircled{70} \quad \boxed{A(A+B) + (B+AA)(A+B)}$$

$$\begin{aligned} & A(A+B) + (B+AA)(A+B) \\ &= A(A+B) + (B+A)(A+B) \\ &= A(A+B) + \underbrace{(A+B)(A+B)}_{A+B} \\ &= A(A+B) + (A+B) \\ &= (A+B)(A+1) \\ &= A+B // \end{aligned}$$

$$\textcircled{72} \quad \boxed{\bar{A}BC + A\bar{B}C + ABC\bar{C} + ABC}$$

$$\begin{aligned} & \bar{A}BC + A\bar{B}C + ABC\bar{C} + ABC \\ &= BC(\bar{A}+1) + A\bar{B}C + ABC \\ &= BC + A\bar{B}C + ABC \\ &= C(\underbrace{B+A\bar{B}}_{B+A}) + ABC \\ &= CB + CA + ABC = B(C+A) + AC \\ &= BC + BA + AC // \end{aligned}$$

$$\textcircled{66} \quad \boxed{C(\overline{A+B}) + D}$$

$$\begin{aligned} & C(\overline{A+B}) + D \\ &= C(\bar{A}\bar{B}) + D \\ &= \bar{A}\bar{B}C + D // \end{aligned}$$

$$\textcircled{67} \quad \boxed{(\bar{A}+B)[\bar{A}(B+A)]}$$

$$\begin{aligned} & (\bar{A}+B)[\bar{A}(B+A)] \\ &= (\bar{A}+B)[\bar{A}B + \bar{A}A] \\ &= (\bar{A}+B)(\bar{A}B) \\ &= \bar{A}\bar{A}B + B\bar{A}B \\ &= \bar{A}B + B\bar{A} = \bar{A}B // \end{aligned}$$

$$\textcircled{69} \quad \boxed{(A+C)(AD+A\bar{D}) + AC + C}$$

$$\begin{aligned} & (A+C)(AD+A\bar{D}) + AC + C \\ &= (A+C)[A(D+\bar{D})] + C(A+1) \\ &= (A+C) \cdot A + C \\ &= AA + AC + C \\ &= A + AC + C = A(1+C) + C \\ &= A + C // \end{aligned}$$

$$\textcircled{71} \quad \boxed{\bar{A}B(C+\bar{C}) + BC(A+\bar{A}) + AC(B+\bar{B})}$$

$$\begin{aligned} & \bar{A}B(C+\bar{C}) + BC(A+\bar{A}) + AC(B+\bar{B}) \\ &= \bar{A}B + BC + AC \\ &= \underbrace{\bar{A}BC}_{AB} + \underbrace{\bar{A}B\bar{C}}_{B\bar{C}} + \underbrace{ABC + \bar{A}BC}_{AC} + \bar{A}B\bar{C} \end{aligned}$$

standart qarpımlar toplamına dönüştürdük

$$\begin{aligned} &= \bar{A}BC + \bar{A}B\bar{C} + ABC + \bar{A}B\bar{C} \\ &= \bar{A}B(C+\bar{C}) + AC(B+\bar{B}) \\ &= \bar{A}B + AC // \end{aligned}$$

$$\textcircled{73} \quad ABC [ABC + \bar{C} (BC + AC)]$$

$$\begin{aligned}
 & ABC [ABC + \bar{C} (BC + AC)] \\
 &= ABC [ABC + \underbrace{BC\bar{C}}_0 + \underbrace{AC\bar{C}}_0] \\
 &= ABC \cdot ABC = ABC //
 \end{aligned}$$

$$\textcircled{75} \quad ABC + A\bar{B} (\bar{A}\bar{C})$$

$$\begin{aligned}
 & ABC + A\bar{B} (\bar{A}\bar{C}) \\
 &= ABC + A\bar{B} (\bar{A} + \bar{C}) \\
 &= ABC + A\bar{B} (A + C) \\
 &= ABC + A\bar{B}A + A\bar{B}C \\
 &= ABC + A\bar{B} + A\bar{B}C \\
 &= ABC + A\bar{B} (1 + C) \\
 &= ABC + A\bar{B} \\
 &= A(\underbrace{BC + \bar{B}}_{\bar{B} + C}) \\
 &= A\bar{B} + AC //
 \end{aligned}$$

$x + \bar{x}y = x + y$
boolean kuralı

$$\textcircled{74} \quad ABC + A\bar{B} (\bar{A}\bar{C})$$

$$\begin{aligned}
 & ABC + A\bar{B} (\bar{A}\bar{C}) \\
 &= ABC + A\bar{B}\bar{A}\bar{C} \\
 &= ABC + \underbrace{A\bar{A}\bar{B}\bar{C}}_0 = ABC //
 \end{aligned}$$

$$\textcircled{76} \quad \overline{AB} (\overline{A+B}) \cdot C$$

$$\begin{aligned}
 & \overline{AB} (\overline{A+B}) \cdot C \\
 &= (\bar{A} + \bar{B}) \cdot (\bar{A}\bar{B}) \cdot C \\
 &= (\bar{A} + \bar{B}) \cdot \bar{A}\bar{B}C \\
 &= \bar{A}\bar{A}\bar{B}C + \bar{A}\bar{B}\bar{B}C \\
 &= \bar{A}\bar{B}C + \bar{A}\bar{B}\bar{C} \\
 &= \bar{A}\bar{B}C //
 \end{aligned}$$

$$\textcircled{77} \quad \overline{AB} + \bar{C}A + \bar{C}B$$

$$\begin{aligned}
 & \overline{AB} + \bar{C}A + \bar{C}B \\
 &= \bar{A}\bar{B} + \bar{C}A + \bar{C}B \\
 &= \bar{A}\bar{B} + \bar{C}(A + B) //
 \end{aligned}$$

$$\textcircled{78} \quad \overline{A+B} + \bar{C}$$

$$\begin{aligned}
 & \overline{A+B} + \bar{C} \\
 &= \bar{A} \cdot \bar{B} + \bar{C} \\
 &= \bar{A}\bar{B} + \bar{C} //
 \end{aligned}$$

$$\textcircled{79} \quad (A + \bar{B} + \bar{C}) (A + \bar{B}C)$$

$$\begin{aligned}
 & (A + \bar{B} + \bar{C}) (A + \bar{B}C) \\
 &= AA + A\bar{B}C + A\bar{B} + \bar{B}\bar{B}C + A\bar{C} + \underbrace{\bar{B}\bar{C}\bar{C}}_0 \\
 &= A + A\bar{B}C + A\bar{B} + \bar{B}C + A\bar{C} \\
 &= A(1 + \bar{B}C + \bar{B} + \bar{C}) + \bar{B}C = A + \bar{B}C //
 \end{aligned}$$

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$$\boxed{(\bar{A}+B+C)(\bar{B}+C+D)(\bar{A}+\bar{B}+\bar{C}+D)}$$

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

$$= (\bar{A}+B+C) (\underbrace{\bar{B}\bar{A} + \bar{B}\bar{B} + \bar{B}\bar{C} + \bar{B}D}_{\bar{B}} + \underbrace{\bar{A}C + \bar{B}C + \underbrace{C\bar{C}}_0 + CD}_{0} + \underbrace{\bar{A}D + \bar{B}D + \bar{C}D + \underbrace{DD}_0}_{0})$$

$$= (\bar{A}+B+C) (\bar{B}\bar{A} + \bar{B} + \bar{B}\bar{C} + \bar{B}D + \bar{A}C + \bar{B}C + CD + \bar{A}D + \bar{B}D + \bar{C}D)$$

$$= (\bar{A}+B+C) [\underbrace{\bar{B}(\bar{A}+1+\bar{C}+D+D)}_1 + \bar{A}C + CD + \bar{A}D + \bar{C}D]$$

$$= (\bar{A}+B+C) (\bar{B} + \bar{A}C + CD + \bar{A}D + \bar{C}D)$$

$$= \bar{A}\bar{B} + \bar{A}\bar{A}C + \bar{A}CD + \bar{A}\bar{A}D + \bar{A}\bar{C}D + \underbrace{B\bar{B}}_0 + B\bar{A}C + BCD + B\bar{A}D + B\bar{C}D + C\bar{B} + C\bar{A}C + C\bar{C}D + C\bar{A}D + \underbrace{C\bar{C}D}_0$$

$$= \bar{A}\bar{B} + \underbrace{\bar{A}C + \bar{A}CD}_{\bar{A}C} + \underbrace{\bar{A}D + \bar{A}\bar{C}D}_{\bar{A}D} + \bar{A}BC + BCD + \bar{A}B\bar{D} + B\bar{C}D + \bar{B}C + \bar{A}C + \underbrace{CD + \bar{A}CD}_{C(D+\bar{A})} \\ \underbrace{C(D+\bar{A})}_{C(D+\bar{A})} \\ \underbrace{CD + \bar{A}C}_{CD + \bar{A}C}$$

$$= \bar{A}\bar{B} + \bar{A}C + \bar{A}D + \bar{A}BC + \underbrace{BCD + \bar{A}B\bar{D} + B\bar{C}D}_{CD} + \bar{B}C + \bar{A}C$$

$$= \bar{A}\bar{B} + \bar{A}C + \bar{A}D + \bar{A}BC + \underbrace{CD}_{CD} + \bar{A}B\bar{D} + B\bar{C}D + \bar{B}C$$

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

81

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

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

$$= (\bar{A}+B)(\bar{B}C+B\bar{C})(\underbrace{A\bar{C} + A\bar{C} + \underbrace{C\bar{C}}_0 + CA}_{0})$$

$$= (\bar{A}+B)(\bar{B}C+B\bar{C})(\bar{A}\bar{C} + A + CA)$$

$$= (\bar{A}+B)(\bar{B}C+B\bar{C}) \underbrace{[A(\bar{C}+1+C)]}_A$$

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

$$= \underbrace{(A\bar{A} + AB)}_0 (\bar{B}C+B\bar{C}) = AB(\bar{B}C+B\bar{C}) = \underbrace{AB\bar{B}C + AB\bar{B}\bar{C}}_0 = AB\bar{C} //$$

$$\textcircled{82} \quad \overline{B} + \overline{B}C + ABC\overline{C}$$

$$\begin{aligned} & \overline{B} + \overline{B}C + ABC\overline{C} \\ &= \overline{B}(1+C) + ABC\overline{C} \\ &= \overline{B} + ABC\overline{C} = \overline{B} + \underbrace{B}_x \underbrace{A}_x \underbrace{C\overline{C}}_y \\ & \quad x + \overline{x}y = x + y \text{ boolean kuralı} \\ &= \overline{B} + A\overline{C} // \end{aligned}$$

$$\textcircled{83} \quad AB + B\overline{C} + \overline{B}C + \overline{A}B$$

$$\begin{aligned} & AB + B\overline{C} + \overline{B}C + \overline{A}B \\ &= B(\underbrace{A+\overline{A}}_1) + B\overline{C} + \overline{B}C \\ &= B + B\overline{C} + \overline{B}C = B(\underbrace{1+\overline{C}}_1) + \overline{B}C \\ &= \underbrace{B}_x + \underbrace{\overline{B}C}_x \quad x + \overline{x}y = x + y \text{ kuralı} \\ &= B + C // \end{aligned}$$

$$\textcircled{84} \quad \overline{A(A+C)}$$

$$\begin{aligned} & \overline{A(A+C)} \\ &= \overline{AA+AC} = \overline{A+AC} \\ &= \overline{A(1+C)} \\ &= \overline{A} // \end{aligned}$$

$$\textcircled{85} \quad \overline{A(A+B)} + (B+AA)(A+\overline{B})$$

$$\begin{aligned} & \overline{A(A+B)} + (B+AA)(A+\overline{B}) \\ &= \underbrace{\overline{A}}_0 + \overline{A}B + (B+A)(A+\overline{B}) \\ &= \overline{A}B + BA + \underbrace{B\overline{B}}_0 + \underbrace{AA}_A + A\overline{B} \\ &= \overline{A}B + AB + A + A\overline{B} = \overline{A}B + A(\underbrace{B+1+\overline{B}}_1) \\ &= \overline{A}B + A \quad (x + \overline{x}y = x + y \text{ kuralı}) \\ &= A + B // \end{aligned}$$

$$\textcircled{86} \quad \overline{A}B(\overline{A}+B)(\overline{B}+B)$$

$$\begin{aligned} & \overline{A}B(\overline{A}+B)(\overline{B}+B) \\ &= (\overline{A}+B)(\overline{A}+B) = \underbrace{\overline{A}\overline{A}}_A + \overline{A}B + \overline{A}B + \underbrace{B\overline{B}}_0 \\ &= \overline{A} + \overline{A}B + \overline{A}B \\ &= \overline{A}(1+B+\overline{B}) \\ &= \overline{A} // \end{aligned}$$

$$\textcircled{87} \quad \overline{A}B\overline{C} + B\overline{C}\overline{D} + ACD + \overline{A}B$$

$$\begin{aligned} & \overline{A}B\overline{C} + B\overline{C}\overline{D} + ACD + \overline{A}B \\ &= \overline{A}B(\underbrace{C+1}_1) + B\overline{C}\overline{D} + ACD \\ &= \overline{A}B + B\overline{C}\overline{D} + ACD // \end{aligned}$$

$$\textcircled{88} \quad (A+B+\overline{C})(\overline{A}\overline{B}+C)$$

$$\begin{aligned} & (A+B+\overline{C})(\overline{A}\overline{B}+C) \\ &= \underbrace{A\overline{A}\overline{B}}_0 + AC + \underbrace{B\overline{A}\overline{B}}_0 + BC + \overline{C}\overline{A}\overline{B} + \underbrace{C\overline{C}}_0 = AC + BC + \overline{A}\overline{B}\overline{C} // \end{aligned}$$

89) $(\bar{A}+B) [\bar{A} (B+A)]$

$$\begin{aligned} & (\bar{A}+B) [\bar{A} (B+A)] \\ &= (\bar{A}+B) (\bar{A} B + \bar{A} A) \\ &= (\bar{A}+B) \cdot \bar{A} B \\ &= \bar{A} \bar{A} B + \bar{A} A B \\ &= \bar{A} B + \bar{A} B = \bar{A} B // \end{aligned}$$

90) $A\bar{B} + \bar{B}\bar{C} + \bar{A}\bar{C}$

$$\begin{aligned} & A\bar{B} + \bar{B}\bar{C} + \bar{A}\bar{C} \\ &= A\bar{B}C + A\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}\bar{B}\bar{C} \\ & \quad (\text{standart karpimlern toplama d\u00f6n\u00fcst\u00fcr\u00fcl\u00fck}) \\ &= A\bar{B}C + A\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}B\bar{C} \\ &= A\bar{B}C + A\bar{B}\bar{C} + \bar{B}\bar{C}(\bar{A}+A) = A\bar{B}C + A\bar{B}\bar{C} + \bar{B}\bar{C} \\ &= A\bar{B}C + \bar{C}(\bar{A}B + B) = A\bar{B}C + \bar{C}B + \bar{A}\bar{C} \\ &= \bar{B}(\bar{A}C + \bar{C}) + \bar{A}\bar{C} = \bar{B}\bar{C} + \bar{B}A + \bar{A}\bar{C} \text{ ayn\u0131n\u0131 abt.} \\ & \quad \bar{C}+A \qquad \qquad \qquad \bar{C}+A \end{aligned}$$

91) $\overline{AB + \bar{C}D}$

$$\begin{aligned} & \overline{AB + \bar{C}D} \\ &= \bar{A}\bar{B} \cdot \bar{\bar{C}D} = (\bar{A} + \bar{B}) \cdot (\bar{C} + \bar{D}) \\ &= (\bar{A} + \bar{B})(\bar{C} + \bar{D}) = \bar{A}\bar{C} + \bar{A}\bar{D} + \bar{B}\bar{C} + \bar{B}\bar{D} // \end{aligned}$$

92) $\overline{\bar{C}(\bar{A} + B)}$

$$\begin{aligned} & \overline{\bar{C}(\bar{A} + B)} = \bar{\bar{C}}(\bar{\bar{A} + B}) \\ &= \bar{C} + \overline{\bar{A} + B} \\ &= \bar{C} + \bar{A} \cdot \bar{B} = \bar{C} + \bar{A}\bar{B} // \end{aligned}$$

93) $\overline{(\bar{A} + C)(B + \bar{D})}$

$$\begin{aligned} & \overline{(\bar{A} + C)(B + \bar{D})} \\ &= \overline{(\bar{A} + C) + (B + \bar{D})} \\ &= \bar{A} \cdot \bar{C} + \bar{B} + \bar{D} \\ &= \bar{A}\bar{C} + \bar{B} + \bar{D} // \end{aligned}$$

94) $\overline{ABC + (\bar{D} + E)}$

$$\begin{aligned} & \overline{ABC + (\bar{D} + E)} = \overline{(\bar{A} + \bar{B} + \bar{C}) \cdot \bar{D} \cdot E} \\ &= \bar{A}\bar{D}\bar{E} + \bar{B}\bar{D}\bar{E} + \bar{C}\bar{D}\bar{E} // \end{aligned}$$

95) $\overline{(\bar{A} + C)(\bar{A}B)}$

$$\begin{aligned} & \overline{(\bar{A} + C)(\bar{A}B)} \\ &= \overline{(\bar{A} + C) + \bar{A}B} \\ &= \bar{A} \cdot \bar{C} + \bar{A}B \\ &= \bar{A}\bar{C} + \bar{A}B // \end{aligned}$$

96) $\overline{\bar{A}B + \bar{A}\bar{B}}$

$$\begin{aligned} & \overline{\bar{A}B + \bar{A}\bar{B}} \\ &= \bar{A}B + \bar{A}\bar{B} \\ &= \bar{A}B \cdot \bar{A}\bar{B} \\ &= (\bar{A} + \bar{B}) \cdot (\bar{A} + \bar{B}) \\ &= (\bar{A} + \bar{B}) \cdot (\bar{A} + \bar{B}) \\ &= \bar{A}\bar{A} + \bar{A}\bar{B} + \bar{A}\bar{B} + \bar{B}\bar{B} \\ &= \bar{A}B + \bar{A}\bar{B} // \end{aligned}$$

97) $\overline{(AB + \bar{C}) \cdot D}$

$$\begin{aligned} & \overline{(AB + \bar{C}) \cdot D} \\ &= \overline{ABD + \bar{C}D} = \bar{A}\bar{B}\bar{D} + \bar{C}\bar{D} \\ &= \bar{A}\bar{B}\bar{D} \cdot (\bar{C} + \bar{D}) = (\bar{A} + \bar{B} + \bar{D}) \cdot (\bar{C} + \bar{D}) \\ &= \bar{A}\bar{C} + \bar{A}\bar{D} + \bar{B}\bar{C} + \bar{B}\bar{D} + \bar{D}\bar{C} + \bar{D}\bar{D} \\ &= \bar{A}\bar{C} + \bar{B}\bar{C} + \bar{D}(\bar{A} + \bar{B} + \bar{C} + 1) \\ &= \bar{A}\bar{C} + \bar{B}\bar{C} + \bar{D} // \end{aligned}$$

98 $XZ + Z(\bar{X} + XY)$

$$\begin{aligned} XZ + Z(\bar{X} + XY) \\ = XZ + \bar{X}Z + XYZ \\ = XZ(1+Y) + \bar{X}Z \\ = XZ + \bar{X}Z = Z(\underline{X+\bar{X}}) \\ = Z // \end{aligned}$$

100 $\bar{A} + \bar{B} + \bar{A}\bar{B}$

$$\begin{aligned} \bar{A} + \bar{B} + \bar{A}\bar{B} \\ = \bar{A} + \bar{B}(1+\bar{A}) \\ = \bar{A} + \bar{B} // \end{aligned}$$

103 $\overline{(A+BC)} + A(B+\bar{C})$

$$\begin{aligned} = \overline{(A+BC)} + AB + A\bar{C} \\ = \bar{A} \cdot \bar{BC} + AB + A\bar{C} \\ = \bar{A}(\bar{B} + \bar{C}) + AB + A\bar{C} \\ = \bar{A}\bar{B} + \bar{A}\bar{C} + AB + A\bar{C} // \end{aligned}$$

105 $\bar{B}[C(\bar{D} + E + C) + \bar{F}C]$

$$\begin{aligned} \bar{B}[C(\bar{D} + E + C) + \bar{F}C] \\ = \bar{B}[C\bar{D} + CE + \underline{CC} + \bar{F}C] \\ = \bar{B}[C(\bar{D} + E + \underline{1} + \bar{F})] \\ = \bar{B}C // \end{aligned}$$

99 $DE + \bar{D} + \bar{E}$

$$\begin{aligned} DE + \bar{D} + \bar{E} = \bar{D} + \underline{E + \bar{E}} \\ \bar{D} + E \\ \bar{D} + 1 = 1 // \end{aligned}$$

101 $AB + ABC + ABCD + ABCDE + ABCDEF$

$$= AB(1 + C + CD + CDE + CDEF) = AB //$$

102 $A\bar{B} + AB + BC$

$$A\bar{B} + AB + BC = A(\bar{B} + B) + BC = A + BC //$$

104 $\bar{A}A\bar{C} + \bar{A}B\bar{C} + \bar{A}C\bar{C} + BA\bar{C} + B\bar{B}C + BCC$

$$\begin{aligned} \bar{A}A\bar{C} + \bar{A}B\bar{C} + \bar{A}C\bar{C} + BA\bar{C} + B\bar{B}C + BCC \\ = \bar{A}B\bar{C} + BA\bar{C} + B\bar{C} = B\bar{C}(\bar{A} + A + 1) = B\bar{C} // \end{aligned}$$

106 $\overline{\overline{A+BC} + A\bar{B}}$

$$\begin{aligned} \overline{\overline{A+BC} + A\bar{B}} \\ = \overline{\overline{A+BC}} \cdot \overline{A\bar{B}} \\ = (A+BC)(\bar{A} + \bar{\bar{B}}) \\ = (A+BC)(\bar{A} + B) \\ = \underline{A\bar{A}} + AB + \bar{A}BC + B\bar{B}C \\ = AB + \bar{A}BC + BC = AB + BC(\bar{A} + 1) \\ = AB + BC // \end{aligned}$$

~~$AB + AC //$~~ $AB + BC$

107

$$(A + \bar{B} + C) (\overline{AB + \bar{A}\bar{C}})$$

$$\begin{aligned} & (A + \bar{B} + C) (\overline{AB + \bar{A}\bar{C}}) \\ &= (A + \bar{B} + C) (\bar{A}\bar{B} \cdot \bar{\bar{A}}\bar{\bar{C}}) \\ &= (A + \bar{B} + C) (\bar{A} + \bar{B}) \cdot (\bar{A} + \bar{C}) \\ &= (A + \bar{B} + C) (\bar{A} + \bar{B}) (A + C) \\ &= (\underbrace{A\bar{A} + A\bar{B} + \bar{A}\bar{B} + \bar{B}\bar{B}}_0 + \bar{A}C + \bar{B}C) (A + C) \\ &= (A\bar{B} + \bar{A}\bar{B} + \bar{B} + \bar{A}C + \bar{B}C) (A + C) \\ &= [\bar{B}(\underbrace{A + \bar{A} + 1 + C}_1) + \bar{A}C] (A + C) \\ &= (\bar{B} + \bar{A}C) \cdot (A + C) = \underbrace{A\bar{B} + A\bar{A}C}_0 + \bar{B}C + \bar{A}C \\ &= A\bar{B} + \bar{B}C + \bar{A}C // \end{aligned}$$

108

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

$$\begin{aligned} \overline{(A + B + C) \cdot D} &= \overline{(A + B + C)} \cdot \bar{D} \\ &= \bar{A} \bar{B} \bar{C} \bar{D} // \end{aligned}$$

109

$$\overline{(AB + C)(A + BC)}$$

$$\begin{aligned} &= \overline{(AB + C)} + \overline{(A + BC)} \\ &= \bar{A}\bar{B} \cdot \bar{C} + \bar{A} \cdot \bar{B}C \\ &= (\bar{A} + \bar{B})\bar{C} + \bar{A}(\bar{B} + C) \\ &= \bar{A}\bar{C} + \bar{B}\bar{C} + \bar{A}\bar{B} + \bar{A}C \\ &= \bar{A}\bar{C} + \bar{B}\bar{C} + \bar{A}\bar{B} // \end{aligned}$$

110

$$\overline{(\bar{A} + B) + CD}$$

$$\begin{aligned} & \overline{(\bar{A} + B) + CD} \\ &= \overline{\bar{A} + B} \cdot \bar{C}\bar{D} \\ &= \bar{\bar{A}} \cdot \bar{B} \cdot (\bar{C} + \bar{D}) \\ &= A\bar{B}(\bar{C} + \bar{D}) \\ &= A\bar{B}\bar{C} + A\bar{B}\bar{D} // \end{aligned}$$

111

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

$$\begin{aligned} &= xy + \cancel{xy} + xz + y^2 + yz \\ &= xy + xz + y + yz \\ &= y(\underbrace{x + 1 + z}_1) + xz \\ &= y + xz // \end{aligned}$$

112

$$xy(\bar{x} + y)(\bar{x} + x)$$

$$\begin{aligned} & xy(\bar{x} + y) \underbrace{(\bar{x} + x)}_1 \\ &= xy(\bar{x} + y) = xy\bar{x} + xy^2 \\ &= \underbrace{\cancel{xy\bar{x}}}_0 + xy = xy // \end{aligned}$$

113

$$[\bar{A}\bar{B}(C + \bar{B}D) + \bar{A}\bar{B}] \cdot C$$

$$\begin{aligned} &= (\bar{A}\bar{B}C + \bar{A}\bar{B}\bar{B}D + \bar{A}\bar{B}) \cdot C \\ &= \bar{A}\bar{B}C + \bar{A}\bar{B}CD + \bar{A}\bar{B}C \\ &= \bar{A}\bar{B}C + \bar{A}\bar{B}CD + \bar{A}\bar{B}C \\ &= \bar{A}\bar{B}C(1 + D) + \bar{A}\bar{B}C = \bar{A}\bar{B}C + \bar{A}\bar{B}C \\ &= \bar{B}C(\underbrace{A + \bar{A}}_1) = \bar{B}C // \end{aligned}$$

114

$$[\bar{A}\bar{B}(C + BD) + \bar{A}\bar{B}] \cdot C$$

$$\begin{aligned} &= (\bar{A}\bar{B}C + \bar{A}\bar{B}BD + \bar{A}\bar{B}) \cdot C \\ &= (\bar{A}\bar{B}C + \bar{A}\bar{B}C) = \bar{A}\bar{B}C + \bar{A}\bar{B}C \\ &= \bar{A}\bar{B}C + \bar{A}\bar{B}C = \bar{B}C(\underbrace{A + \bar{A}}_1) \\ &= \bar{B}C // \end{aligned}$$

$$(115) \quad \overline{(A\bar{B} + \bar{A}B)} (A+B)$$

$$\begin{aligned}
 &= \overline{A\bar{B}} \cdot \overline{\bar{A}B} \cdot (A+B) \\
 &= (\overline{A} + \bar{\bar{B}}) \cdot (\bar{\bar{A}} + \bar{B}) (A+B) \\
 &= (\bar{A} + B) (A + \bar{B}) (A+B) \\
 &= (\bar{A}A + \bar{A}\bar{B} + AB + B\bar{B}) (A+B) \\
 &= (\bar{A}\bar{B} + AB) (A+B) \\
 &= \underbrace{\bar{A}\bar{B}}_0 + \underbrace{AB}_0 + \cancel{A\bar{B}} + \cancel{A\bar{B}} \\
 &= AB + \bar{A}\bar{B} = A\bar{B} //
 \end{aligned}$$

$$(116) \quad \overline{(A+B) + \bar{C}}$$

$$\begin{aligned}
 &= \overline{A+B} \cdot \bar{\bar{C}} \\
 &= (A+B) \cdot C \\
 &= AC + BC //
 \end{aligned}$$

$$(117) \quad \overline{(A\bar{B}) (B+C)}$$

$$\begin{aligned}
 &= \overline{A\bar{B}} + \overline{(B+C)} \\
 &= A\bar{B} + \bar{B} \cdot \bar{C} \\
 &= A\bar{B} + \bar{B}\bar{C} //
 \end{aligned}$$

$$(118) \quad \overline{(A+B+C) + \bar{D}E}$$

$$\begin{aligned}
 &= \overline{A+B+C} \cdot \overline{\bar{D}E} \\
 &= \overline{A+B+C} \cdot (D+E) \\
 &= \overline{A+B+C} \cdot D + \overline{A+B+C} \cdot E //
 \end{aligned}$$

$$(119) \quad \overline{(A+B) + \bar{A}(B+C)}$$

$$\begin{aligned}
 &= \overline{A+B} + \overline{\bar{A}(B+C)} \\
 &= \overline{A+B} + A(B+C) \\
 &= \overline{A}(\bar{B} + B + C) = \overline{A} //
 \end{aligned}$$

$$(120) \quad \overline{(A+B) \cdot \bar{C} (C+D)}$$

$$\begin{aligned}
 &= \overline{A+B} \cdot \overline{\bar{C} (C+D)} \\
 &= \overline{A+B} + C //
 \end{aligned}$$

$$(121) \quad \overline{(A+B)C + ABC}$$

$$\begin{aligned}
 &= \overline{AC + BC + ABC} \\
 &= \overline{AC + BC(1+A)} \\
 &= \overline{AC + BC} //
 \end{aligned}$$

$$(122) \quad \overline{AB+AC + \bar{A}\bar{B}C}$$

$$\begin{aligned}
 &= \overline{AB \cdot AC + \bar{A}\bar{B}C} \\
 &= (\bar{A} + \bar{B})(\bar{A} + \bar{C}) + \bar{A}\bar{B}C \\
 &= \cancel{\bar{A} + \bar{A}\bar{C}} + \bar{A}\bar{B} + \bar{B}\bar{C} + \bar{A}\bar{B}C \\
 &= \bar{A}\bar{B} + \bar{B}\bar{C} + \bar{A}\bar{B}(1+C) \\
 &= \bar{A}\bar{B} + \bar{B}\bar{C} + \bar{A}\bar{B} //
 \end{aligned}$$

$$(123) \quad \overline{(A+\bar{A})(AB + A\bar{B}\bar{C})}$$

$$\begin{aligned}
 &= \underbrace{(A+\bar{A})}_1 (AB + A\bar{B}\bar{C}) \\
 &= AB + A\bar{B}\bar{C} \\
 &= AB(1 + \bar{B}\bar{C}) = AB //
 \end{aligned}$$

$$(124) \quad \overline{A\bar{B}C(BD + CDE) + A\bar{C}}$$

$$\begin{aligned}
 &= \overline{A\bar{B}BCD + A\bar{B}CDE + A\bar{C}} \\
 &= \overline{A\bar{B}CDE + A\bar{C}} = A(\bar{B}CDE + \bar{C}) \\
 &= A(\underbrace{\bar{C} + \underbrace{C}_{x} \underbrace{\bar{B}DE}_{y}}_{x+\bar{y}=x+y}) = A(\bar{C} + \bar{B}DE) = A\bar{C} + A\bar{B}DE //
 \end{aligned}$$

$$(125) \quad \overline{(B+BC)(B+\bar{B}C)(B+D)}$$

$$\begin{aligned}
 &= (B+BC)(B+\bar{B}C)(B+D) \\
 &= [B(1+C)] \cdot (B+C)(B+D) \\
 &= B(B+C)(B+D) = (B\bar{B} + BC)(B+D) \\
 &= (B+BC)(B+D) = [B(1+C)] \cdot (B+D) = B(B+D) = BB + BD \\
 &= B + BD = B(1+D) = B //
 \end{aligned}$$

131. sorunun çözümüne bakınız.

$$(126) \quad \boxed{A\bar{B}(C+D) + \bar{A}\bar{B}} \cdot C$$

$$= [A\bar{B}C + \underbrace{A\bar{B}BD}_0 + \bar{A}\bar{B}] \cdot C$$

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

$$= A\bar{B}C + \bar{A}\bar{B}C = \bar{B}C(\underbrace{A+\bar{A}}_1) = \bar{B}C //$$

$$(128) \quad \boxed{\bar{A}BC + A\bar{B}\bar{C} + \bar{A}\bar{B}C + A\bar{B}C + ABC}$$

$$= \bar{A}C(\underbrace{B+\bar{B}}_1) + \bar{A}\bar{B}(\underbrace{\bar{C}+C}_1) + ABC$$

$$= \bar{A}C + \bar{A}\bar{B} + ABC = \bar{A}C + A(\underbrace{\bar{B}+BC}_x \quad \underbrace{BC}_y)$$

$x + \bar{x}y = x + y$ kuralı

$$= \bar{A}C + A(\bar{B} + C) = \bar{A}C + A\bar{B} + AC$$

$$= C(\underbrace{\bar{A}+A}_1) + A\bar{B} = C + A\bar{B} //$$

$$(130) \quad \boxed{ABC [AB + \bar{C}(BC + AC)]}$$

$$= ABC [AB + \underbrace{BC\bar{C}}_0 + \underbrace{AC\bar{C}}_0]$$

$$= ABC \cdot AB = ABC //$$

$$(132) \quad \boxed{ABCD + AB\bar{C} + AB\bar{D} + \bar{A}CD + \bar{B}CD}$$

$$= AB(\underbrace{CD+\bar{C}}_{x+\bar{x}y=x+y}) + AB\bar{D} + \bar{A}CD + \bar{B}CD$$

$$= AB(\bar{C}+D) + AB\bar{D} + \bar{A}CD + \bar{B}CD$$

$$= AB\bar{C} + \underbrace{ABD + AB\bar{D}}_{AB} + \bar{A}CD + \bar{B}CD$$

$$= AB(\underbrace{\bar{C}+1}_1) + \bar{A}CD + \bar{B}CD = AB + \bar{A}CD + \bar{B}CD //$$

$$(127) \quad \boxed{A\bar{B} + A(\bar{B}+C) + B(\bar{B}+C)}$$

$$= A\bar{B} + A\bar{B}\bar{C} + \underbrace{AB\bar{C}}_0$$

$$= A\bar{B} + A\bar{B}\bar{C} = A\bar{B}(1 + \bar{C})$$

$$= A\bar{B} //$$

$$(129) \quad \boxed{A\bar{B}C + \bar{A}BC + \bar{A}\bar{B}C}$$

$$= \bar{B}C(\underbrace{A+\bar{A}}_1) + \bar{A}\bar{B}C$$

$$= \bar{B}C + \bar{A}\bar{B}C = C(\underbrace{\bar{B}+\bar{B}\bar{A}}_x \quad \underbrace{\bar{A}}_y)$$

$$= C(\bar{B} + \bar{A}) = \bar{B}C + \bar{A}C //$$

$$(131) \quad \boxed{\overline{AB+AC} + \bar{A}\bar{B}C}$$

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

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

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

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

$$(133) \quad \boxed{(AB+C)(\bar{B}D+\bar{C}E) + \overline{AB+C}}$$

$$= \underbrace{AB\bar{B}D}_0 + AB\bar{C}E + \bar{B}CD + \underbrace{CCE}_0 + \bar{A}\bar{B} \cdot \bar{C}$$

$$= AB\bar{C}E + \bar{B}CD + (\bar{A}+\bar{B}) \cdot \bar{C}$$

$$= AB\bar{C}E + \bar{B}CD + \bar{A}\bar{C} + \bar{B}\bar{C}$$

$$= \bar{C}(AB\bar{E} + \bar{A}) + \bar{B}(CD + \bar{C})$$

$$= \bar{C}(\bar{A} + B\bar{E}) + \bar{B}(\bar{C} + D)$$

$$= \bar{A}\bar{C} + B\bar{C}\bar{E} + \bar{B}\bar{C} + \bar{B}D //$$

134) $[A + \bar{B}C + D + EF] [A + \bar{B}C + \overline{(D+EF)}]$

$$\begin{aligned}
 &= (A + \bar{B}C + D + EF) [A + \bar{B}C + \bar{D} \cdot \bar{E}\bar{F}] \\
 &= (A + \bar{B}C + D + EF) [A + \bar{B}C + \bar{D}(\bar{E} + \bar{F})] \\
 &= (A + \bar{B}C + D + EF) (A + \bar{B}C + \bar{D}\bar{E} + \bar{D}\bar{F}) \\
 &= \cancel{AA} + \bar{A}BC + \cancel{AD\bar{E}} + \cancel{AD\bar{F}} + \cancel{A\bar{B}C} + \bar{B}C\bar{B} + \bar{B}C\bar{D}\bar{E} + \bar{B}C\bar{D}\bar{F} + \cancel{AD\bar{B}C} + \underbrace{\bar{D}\bar{D}\bar{E}}_0 + \underbrace{\bar{D}\bar{D}\bar{F}}_0 \\
 &\quad + \underbrace{AEF}_0 + \underbrace{\bar{B}CE\bar{F}}_0 + \underbrace{\bar{E}\bar{E}\bar{F}\bar{D}}_0 + \underbrace{\bar{E}\bar{F}\bar{D}\bar{F}}_0 \\
 &= A + \bar{A}BC + \bar{A}\bar{D}\bar{E} + \bar{A}\bar{D}\bar{F} + \bar{B}C + \bar{B}C\bar{D}\bar{E} + \bar{B}C\bar{D}\bar{F} + \cancel{AD\bar{B}C} + AEF + \bar{B}CE\bar{F} \\
 &= A(1 + \bar{B}C + \bar{D}\bar{E} + \bar{D}\bar{F} + \bar{D} + EF) + \bar{B}C(1 + \bar{D}\bar{E} + \bar{D}\bar{F} + \bar{D} + EF) = A + \bar{B}C //
 \end{aligned}$$

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$$\begin{aligned}
 &= \underbrace{(A + \bar{B}C + D + EF)}_x \underbrace{[A + \bar{B}C + \overline{(D+EF)}]}_y = (x+y)(x+y) = x\cancel{x} + x\bar{y} + yx + \underbrace{yy}_0 \\
 &= x + x\bar{y} + xy \\
 &= x(1 + \bar{y} + y) = x \\
 &\text{yani } = A + \bar{B}C //
 \end{aligned}$$

135) $\overline{\overline{A+BC} + \overline{A\bar{B}}}$

$$\begin{aligned}
 &= \overline{\overline{A+BC}} \cdot \overline{\overline{A\bar{B}}} \\
 &= (A+BC)(A\bar{B}) \\
 &= \cancel{A\bar{A}\bar{B}} + \underbrace{\bar{A}BC}_0 \\
 &= A\bar{B} //
 \end{aligned}$$

136) $\overline{(\bar{A} + \bar{B})(\bar{C} + \bar{D} + \bar{E}) + (\bar{A} + \bar{B})}$

$$\begin{aligned}
 &\underbrace{(\bar{A} + \bar{B})}_x \underbrace{(\bar{C} + \bar{D} + \bar{E})}_y + \underbrace{(\bar{A} + \bar{B})}_x \rightarrow x \\
 &= xy + x = x(y+1) = x \\
 &= \overline{\bar{A} + \bar{B}} = A\bar{B} //
 \end{aligned}$$

137) $\overline{\bar{A}\bar{B} + \bar{C}\bar{D} + \bar{E}\bar{F}}$

$$\begin{aligned}
 &= \bar{A}\bar{B} \cdot \bar{C}\bar{D} \cdot \bar{E}\bar{F} = (\bar{A} + \bar{B})(\bar{C} + \bar{D})(\bar{E} + \bar{F}) \\
 &= (\bar{A} + \bar{B})(\bar{C} + \bar{D})(\bar{E} + \bar{F}) //
 \end{aligned}$$

(138)

$$\overline{(A+B) \bar{C} \bar{D} + E + \bar{F}}$$

$$\begin{aligned} &= \overline{(A+B) \bar{C} \bar{D}} \cdot \bar{E} \cdot \bar{F} \\ &= \overline{(A+B) + \bar{C} + \bar{D}} \cdot \bar{E} \bar{F} \\ &= (\bar{A} \bar{B} + C + D) \bar{E} \bar{F} \\ &= \bar{A} \bar{B} \bar{E} \bar{F} + C \bar{E} \bar{F} + D \bar{E} \bar{F} // \end{aligned}$$

(139)

$$\overline{(A+B) \cdot \bar{C}}$$

$$= \bar{A} \cdot \bar{B} \cdot \bar{C} //$$

(140)

$$\overline{(\bar{A} + ABC) (A + \bar{C})}$$

$$\begin{aligned} &= \overline{(\bar{A} + \underbrace{ABC}_{\substack{x \quad \bar{x} \quad y}})} (A + \bar{C}) \\ &\quad x + \bar{x}y = x + y \text{ kural} \\ &= \overline{(\bar{A} + BC) (A + \bar{C})} \\ &= \underbrace{\bar{A}A}_0 + \bar{A}\bar{C} + \underbrace{ABC + BC\bar{C}}_0 \\ &= \bar{A}\bar{C} + ABC // \end{aligned}$$

(141)

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

$$\begin{aligned} &= \overline{(\bar{A} + \bar{B} + \bar{C})} + \overline{(\bar{A} + \bar{B} + \bar{C} + \bar{C})} + D \\ &= (A + B + C) + (A + B + C + \bar{C}) + D \\ &= A + B + C + A + B + 1 + D = 1 // \end{aligned}$$

(142)

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

$$\begin{aligned} &= \overline{AB + \cancel{AB} + AC + \cancel{B\bar{B}} + BC} \\ &= \overline{AB + AC + B + BC} \\ &= \overline{B(A + 1 + C) + AC} = \overline{B + AC} // \end{aligned}$$

(143)

$$\overline{\overline{A+B+C} + \overline{D+E+F}}$$

$$\begin{aligned} &= \overline{\overline{A+B+C}} \cdot \overline{\overline{D+E+F}} \\ &= (\overline{A+B+C}) \cdot (\overline{D+E+F}) \\ &= (\bar{A} \bar{B} + C) \cdot (\bar{D} \bar{E} + F) \\ &= \bar{A} \bar{B} \bar{D} \bar{E} + \bar{A} \bar{B} F + C \bar{D} \bar{E} + CF // \end{aligned}$$

(144)

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

$$\begin{aligned} &= \overline{\bar{A} \bar{B} \bar{C} + AC\bar{D} + A\bar{B}} \\ &= \overline{\bar{B}(\underbrace{\bar{A}\bar{C} + A}_{\substack{\bar{x} \quad y \quad x}})} + AC\bar{D}} \\ &\quad x + \bar{x}y = x + y \text{ kural} \\ &= \overline{\bar{B}(A + \bar{C}) + AC\bar{D}} \\ &= \overline{\bar{A}\bar{B} + \bar{B}\bar{C} + AC\bar{D}} // \end{aligned}$$