contact@boolean-algebra.com

Boolean Algebra Simplifier

$\left(\left(\overline{(\overline{CD})}\,(BD)\right)+\left(\overline{(\overline{CD})}\,(BD)\right)\right)$ Go

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Help: Press '!' to insert a Not

Solution: $BD+C\overline{D}$

Steps

Start
$\overline{CD}\,\overline{BD}+\overline{\overline{CD}}\,BD$

Apply the Involution Law: $\overline{\overline{A}} = A$
$\overline{CD}\,BD+\overline{\overline{CD}}\,BD$

Apply the Involution Law: $\overline{\overline{A}} = A$
$\overline{CD}\,BD+CD\,BD$

Apply: Demorgan Theorm
$(\overline{C}+\overline{D})BD+CD\,BD$

Apply the Involution Law: $\overline{\overline{A}} = A$
$(\overline{C}+D)BD+CD\,BD$

Apply: Demorgan Theorm
$(\overline{C}+D)BD+CD(\overline{B}+\overline{D})$

Apply: Distribution
$BD\overline{C}+BDD+CD(\overline{B}+\overline{D})$

Apply the Idempotent Law: $AA = A$
$BD\overline{C}+BD+CD(\overline{B}+\overline{D})$

Apply the Absorption Law: $A+AB = A$
$BD+CD(\overline{B}+\overline{D})$

Apply: Distribution
$BD+CD\overline{B}+CD\overline{D}$

Apply the Idempotent Law: $AA = A$
$BD+CD\overline{B}+CD$

Apply the Absorption Law: $A+AB = A$
$BD+CD$

Product of Sum Steps

Not the equation
$\overline{BD+CD}$

Apply: Demorgan Theorm
$(\overline{B}+\overline{D})(\overline{C}+\overline{D})$

Apply the Involution Law: $\overline{\overline{A}} = A$
$(\overline{B}+\overline{D})(\overline{C}+D)$

Apply: Distribution
$(\overline{C}+D)\overline{B}+(\overline{C}+D)\overline{D}$

Apply: Distribution
$\overline{B}\,\overline{C}+\overline{B}D+(\overline{C}+D)\overline{D}$

Apply: Distribution
$\overline{B}\,\overline{C}+\overline{B}D+\overline{D}\,\overline{C}+\overline{D}D$

Apply the Complement Law: $A\overline{A} = 0$
$\overline{B}\,\overline{C}+\overline{B}D+\overline{D}\,\overline{C}+0$

Apply the Identity Law: $A+0 = A$
$\overline{B}\,\overline{C}+\overline{B}D+\overline{D}\,\overline{C}$

Apply: Consensus
$\overline{B}D+\overline{D}\,\overline{C}$

Not the equation to cancel the first not
$\overline{\overline{B}D+\overline{D}\,\overline{C}}$

Apply: Demorgan Theorm
$(\overline{\overline{B}}+\overline{D})(\overline{\overline{D}}+\overline{\overline{C}})$

Apply the Involution Law: $\overline{\overline{A}} = A$
$(B+\overline{D})(\overline{\overline{D}}+\overline{\overline{C}})$

Apply the Involution Law: $\overline{\overline{A}} = A$
$(B+\overline{D})(D+\overline{\overline{C}})$

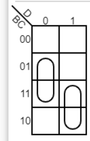
Apply the Involution Law: $\overline{\overline{A}} = A$
$(B+\overline{D})(D+C)$

Truth Table

B	C	D	Output
0	0	0	F
0	0	1	F
0	1	0	T
0	1	1	F
1	0	0	F
1	0	1	T
1	1	0	T
1	1	1	T

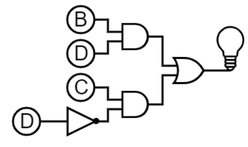
$\overline{B}C\overline{D}+B\overline{C}D+BC\overline{D}+BCD$

K-Map



Logic Gate

View Non-minimalized



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