Examples in Boolean Expression Simplification:

$C + \overline{(BC)}$

Expression	Rule(s) Used
$C + \overline{(BC)}$	Original Expression
$C + (\overline{B} + \overline{C})$	DeMorgan's Law
$(C + \overline{C}) + \overline{B}$	Commutative, Associative Laws
$1 + \overline{B}$	Compliment Law
1	Identity Law

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

Expression	Rule(s) Used
$\overline{(AB)}(\overline{A} + B)(\overline{B} + B)$	Original Expression
$\overline{(AB)}(\overline{A} + B)(1)$	Compliment law, Identity law
$(\overline{A} + B)(\overline{A} + B)$	De Morgan's Law (AND with 1 was dropped because A*1=A)
$\overline{A}\,\overline{A} + \overline{A}B + B\,\overline{A} + B\,B$	Distributive Law
$\overline{A} + \overline{A}(B + \overline{B}) + 0$	Redundancy (on $\overline{A}$s), Identities
$\overline{A} + \overline{A}(1)$	
$\overline{A}$	

$(A + C)(AD + \overline{AD}) + AC + C$

Expression	Rule(s) Used
$(A + C)(AD + \overline{AD}) + AC + C$	Original Expression
$(A + C)A(D + \overline{D}) + AC + C$	Distributive.
$(A + C)A + AC + C$	Compliment, Identity.
$AA + AC + AC + C$	Distributive.
$A + AC + C$	Redundancy
$A + C + C$	Identity (A + AC = A + C)
$A + C$	Redundancy

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

Expression	Rule(s) Used
$\overline{(A)}(A + B) + (B + A)\overline{(A + B)}$	Original Expression
$\overline{(A)}A + \overline{(A)}B + (B + A)A + (B + A)\overline{(B)}$	Distributive
$\overline{(A)}B + (B + A)A + (B + A)\overline{(B)}$	$\overline{A}A = 0$
$\overline{(A)}B + BA + AA + B\overline{(B)} + A\overline{(B)}$	Redundancy and Identity
$\overline{A}\,\overline{B}$	

$(A)B + BA + A + A(B)$	Redundancy
$\overline{(A)}B + AB + A + A\overline{(B)}$	Rearranging
$\overline{(A)}B + A(B + 1 + \overline{B})$	Commutative
$\overline{AB} + A$	Redundancy
$A + B$	Identity

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

Expression	Rule(s) Used
$A(A + \overline{BC}) + A(B + C)$	
$AA + A\overline{BC} + AB + AC$	
$A + A\overline{BC} + AB + AC$	
$A + AB(C + 1) + AC$	
$A + AB + AC$	
$A\ (1 + B + C)$	
A	

Send comments to: sjkuyath@uncc.edu
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