Rule 10 proof

$A + AB = A$ Distributive

$A(1 + B)$ #2

$A(1)$

A

Rule 11 proof

$A + \bar{A}B = A + B$ reverse rule#10

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

$A + \underbrace{AB + \bar{A}B}$ Dist.

$A + B(\underbrace{A + \bar{A}}_{1})$

$A + B(1)$

$A + B$

Rule 12

$(A+B)(A+C) = A+BC$

$AA + AC + BA + BC$ Dist.

$AA + AC + AB + BC$ commutative

$A + AC + AB + BC$ rule 7

$A(1 + C + B) + BC$ Dist.

$A(1) + BC$ rule 2

$A + BC$

Examples

$W = ABC + CAB + BAC$ comm.

$= ABC + ABC + ABC$ rule 5 (all the same term)

$= ABC$

$X = ABC + AB\bar{C}$ Dist.

$= AB(C + \bar{C})$ #6

$= AB(1)$

$= AB$

$Q = x(\bar{x}yz + \bar{x}y\bar{z})$ Dist

$= x\bar{x}yz + x\bar{x}y\bar{z}$ rule 8

rule 3

$0 + 0$

$= 0$

OR

$Q = x(\bar{x}yz + \bar{x}y\bar{z})$ Dist.

$= x(\bar{x}y(z + \bar{z}))$ rule 6

$= x(\bar{x}y(1))$ rule 4

$= x(\bar{x}y)$ Assoc.

$= x\bar{x}y$ rule 8

$(0)y$ rule 3

$= 0$

$a + \bar{a}b$ rule 11

$a + b$

$(\bar{a} + \bar{b})(\bar{a} + b)$ Dist

$\bar{a}\bar{a} + \bar{a}b + \bar{b}\bar{a} + \bar{b}b$ rule 5 + Comm.

$\underbrace{\bar{a} + \bar{a}b + \bar{a}\bar{b}}$ $+ \bar{b}b$ Dist.

$\bar{a}(1 + b + \bar{b}) + \bar{b}b$

$\bar{a} + \bar{b}b$ rule 8

$\bar{a} + 0$ rule 1

A

OR

$(\bar{a} + \bar{b})(\bar{a} + b)$ rule 12

rule $(A + B)(A + C) = A + BC$

where $A = \bar{a}$

$b = \bar{b}$

$c = b$

$\bar{a} + \underbrace{\bar{b}b}_{0}$ rule 8

$\bar{a} + 0$ rule 1

$\bar{a}$

$A\bar{B}C + \bar{A}BC + \bar{A}\bar{B}C$ Dist

$A\bar{B}C + \bar{A}C\underbrace{(B + \bar{B})}_{1}$ rule 6

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

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

$C(\bar{A} + A\bar{B})$ rule 11

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

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