# Proofs

Prove A + AB = A

A + AB = A( 1 + B) Factoring (distributive law)

= A . l Rule : (1 + B) = 1

= A Rule : A . 1 = A

Prove A + A’B = A + B

A + A’B = (A + AB) + A’B Rule : A = A + AB

= (AA + AB) + A’B Rule : A = AA

=AA +AB +AA’ +A’B Rule : adding AA’ = 0

= (A + A’)(A + B) Factoring

= 1. (A + B) Rule : A + A = 1

=A + B Rule : drop the 1

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

(A + B)(A + C) = AA + AC + AB + BC Distributive law

= A + AC + AB + BC Rule : AA = A

= A( 1 + C) + AB + BC Rule : 1 + C = 1

= A. 1 + AB + BC Factoring (distributive law)

= A(1 + B) + BC Rule : 1 + B = 1

= A. 1 + BC Rule : A . 1 = A

= A + BC

# Simplifications

Using Boolean algebra techniques, simplify this expression:

AB + A(B + C) + B(B + C)

Solution

Step 1: Apply the distributive law to the second and third terms in the expression, as follows:

AB + AB + AC + BB + BC

Step 2: Apply rule (BB = B) to the fourth term.

AB + AB + AC + B + BC

Step 3: Apply rule (AB + AB = AB) to the first two terms.

AB + AC + B + BC

Step 4: Apply rule (B + BC = B) to the last two terms.

AB + AC + B

Step 5: Apply rule (AB + B = B) to the first and third terms.

B+AC

At this point the expression is simplified as much as possible