1.

* A . ( A . B + C) | = A. A . A . B + A . C = A . B + A. C
* A . B + A . ~B + ~A . ~B | = A .(B + ~B) + ~A . ~B = A . 1 +~A. ~B = A + ~A . ~B
* A . B . C . A +A . ~B . ~C + ~A . B + ~A . ~B + A . B . ~A | = A . B . C + A . ~B. ~C + ~A . B + ~A . ~B + 0 . B = A. B . C + A . ~B . ~C + ~A . (B + ~B) + 0 = A . B . C + A . ~C + ~A
* A . ~C + A.B.~A + A . B . C +B . B.~C + B . ~A | = A . ~C + 0 . B + A . B . C + B . ~C + B . ~A = ~C. (A + B) + A . B . C + B . ~A
* A . B . C + C . A.B +A . B + A | = A . B . C + A . B + A = A. B + A = A
* B. C + A. D + A . B . C . D + C . D . A + ~A | = B . C +(A .D + A. B. C. D + C. D. A) + ~A = B. C + A. D + ~A
* ~A. B. C + A. ~B. ~C + A. ~B. C + A. B. ~C + A. B. C | = A⋅(∼B⋅∼C+∼B⋅C+B⋅∼C+B⋅C)+∼A⋅B⋅C = A⋅(B+∼B)+∼A⋅B⋅C = A+∼A⋅B⋅C = A+(B⋅C)
* ~~((A.~A.~B).(B.~A.~B)) |= A⋅∼A=0 = 0⋅(B⋅∼A⋅∼B) = 0
* ~(~A.~B)+A+A+~(B.C.D) |= ∼(∼A⋅∼B)= A+B =1
* -(A.B+C).(A+B).C |= C⋅(A⋅B+C) = C⋅(A+B)

2.

Esquerda |= (A+B)⋅(∼A+C) = A⋅(∼A+C)+B⋅(∼A+C) = A⋅∼A+A⋅C+B⋅∼A+B⋅C = 0+A⋅C+B⋅∼A+B⋅C

= A⋅C+B⋅∼A+B⋅C = (A⋅C)+(~A⋅B)

Direita |= (A+B)⋅(∼A+C)⋅(B+C) = (A⋅C+B⋅∼A+B⋅C)⋅(B+C) = (A⋅C+B⋅∼A+B⋅C)⋅(B+C) = A⋅C⋅B+A⋅C⋅C+B⋅∼A⋅B+B⋅∼A⋅C+B⋅C⋅B+B⋅C⋅C = A⋅C⋅B+A⋅C+B⋅∼A⋅B+B⋅∼A⋅C+B⋅C = A⋅C+B⋅∼A+B⋅C = (A⋅C)+(~A⋅B)

3.

(A+B)⋅(∼A+C)=(A+B)⋅(B+C)⋅(∼A+C⋅(B+C))

Esquerda (A+B)⋅(∼A+C) |= A⋅(∼A+C)+B⋅(∼A+C) = A⋅∼A+A⋅C+B⋅∼A+B⋅C = 0+A⋅C+B⋅∼A+B⋅C = A⋅C+B⋅∼A+B⋅C

Direita (A+B)⋅(B+C)⋅(∼A+C⋅(B+C)) |= (A+B)⋅(B+C) = A⋅B+A⋅C+B⋅B+B⋅C = A⋅B+A⋅C+B+B⋅C = A⋅B+A⋅C+B+B⋅C = (A⋅B+A⋅C+B+B⋅C)⋅(∼A+C⋅(B+C)) = A⋅B+A⋅C+B+B⋅C

2.

(A + B) . ( ~A + C) = (A + B) . (~A + C) . (B + C)

= (A + B) [~A.B + ~A.C + C.B + C.C]

= (A + B) [~AB + ~AC + CB + C]

=