1. Here \* means AND, and ‘ means NOT
   1. (X+Y)\*(X+Y’)

= X\*X + X\*Y’ + X\*Y + Y\*Y1

= X + X\*X’ + X\*Y

= X\*(1 + Y + Y’)

= X\*1

= X

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| X | Y | Z | X+Y | X’+Z | Y+Z | (X+Y)\*(X’+Z) | (X+Y)\*(X’+Z)\*(Y+Z) |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 |
| 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

By observation of the right-most two columns being the same, the expressions must be equal: (X+Y)\*(X’+Z) = (X+Y)\*(X’+Z)\*(Y+Z)

1. Let I = (A+C’+F’+G)\*(A+C’+F+G)\*(A+B+C’+D’+G)\*(A+C+E+G)\*(A’+B+G)\*(B+C’+F+G)

Let X = A+C’+G

Therefore (A+C’+F’+G)\*(A+C’+F+G) = (X+F’)\*(X+F) = X = A+C’+G

Therefore I = (A+C’+G)\*(A+B+C’+D’+G)\*(A+C+E+G)\*(A’+B+G)\*(B+C’+F+G)

= (A+C’+G)\*(A’+B+G)\*(B+C’+F+G)\*(A+B+C’+D’+G)\*(A+C+E+G)

= (A+C’+G)\*(A’+B+G)\*(B+C’+G)\*(B+C’+F+G)\*(A+B+C’+D’+G)\*(A+C+E+G) by rule ii.

= (A+C’+G)\*(A’+B+G)\*(B+C’+G)\*(1+F)\*(A+B+C’+D’+G)\*(A+C+E+G)

= (A+C’+G)\*(A’+B+G)\*(B+C’+G)\*(A+B+C’+D’+G)\*(A+C+E+G)

= (A+C’+G)\*(A’+B+G)\*(B+C’+G)\*(A+B+C’+D’+G)\*(A+D’+G)\*(A+C+E+G) by rule ii.

= (A+C’+G)\*(A’+B+G)\*(B+C’+G)\*(A+D’+G)\*(1+B+C’)\*(A+C+E+G)

= (A+C’+G)\*(A’+B+G)\*(B+C’+G)\*(A+D’+G)\*(A+C+E+G)

= (A+C’+G)\*(A’+B+G)\*(A+D’+G)\*(A+C+E+G) by rule ii.

= (A+C’+G)\*(A’+B+G)\*((A+G)+D’)\*((A+G)+(C+E))

= (A+C’+G)\*(A’+B+G)\*((A+G)\*(A+G)+(A+G)\*(C+E)+D’\*(A+G)+D’\*(C+E))

= (A+C’+G)\*(A’+B+G)\*((A+G)\*(1+D’+C+E)+D’\*(C+E))

= (A+C’+G)\*(A’+B+G)\*(A+G+D’\*(C+E))

= (A+C’+G)\*(A’+B+G)\*(A+G+C\*D’+E\*D’)

= (A+C’+G)\*(A’+B+G)\*(A+E+G)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CD\AB | 00 | 01 | 11 | 10 |
| 00 | 1 | 0 | 1 | 1 |
| 01 | 0 | 0 | 1 | 1 |
| 11 | 0 | 0 | 0 | 1 |
| 10 | 0 | 0 | 1 | 1 |

V = ((A’\*B)+(A’\*D)+(A’\*C)+(B\*C\*D))’

= (A’\*B)’\*(A’\*D)’\*(A’\*C)’\*(B\*C\*D)’

= (A+B’)\*(A+D’)\*(A+C’)\*(B’+C’+D’)

* 1. A picture containing text, document

     Description automatically generated