Lecture 5

Last time...

We saw how these were equivalent:

1. x’yz’ + x’yz + xy’z’ + xy’z + xyz
2. x’y + xy’ + xyz
3. x’y + xy’ + xz
4. x’y + xy’ + yz

More simplification

Simplify these:

xyz + x’y + x’y’ = (2 terms, 3 literals)

More simplification

Simplify these:

xyz + x'y + x'y' = (3 terms, 7 literals)

xyz + x' (P9a) (2 terms, 4 literals)

x' + yz (P10a) (2 terms, 3 literals)

Look at tools to see how many literals and terms are removed

wx + wxy + w’yz + w’y’z + w’xyz’ =

(3 terms, 6 literals)

Consensus Property

Denoted as ¢

For any 2 product terms where exactly 1 variable appears uncomplemented in one and complemented in the other, the consensus is defined as the product of the remaining literals

If no such variable exists or if more that one such variable exists, then the consensus is undefined. If we write one term as at_1 and the second as $a't_2$ (where t_1 and t_2 represent product terms), then, if the consensus is defined,

$at_1 ¢ a't_2 = t_1t_2$

Rules

Consensus

P13a. $at_1 + a't_2 + t_1t_2 = at_1 + a't_2$

P13b. $(a + t_1)(a' + t_2)(t_1 + t_2) = (a + t_1)(a' + t_2)$

Simplification using Consensus

bc’ + abd + acd = ?

Convert SOP to Sum of Minterms

Two approaches

By developing a truth table

By using P9a. (adjacency) to add variables to a term

To convert POS to product of maxterms, use P9b

Example

bc’ + ab’c + a’b

a + a’bc’

Convert between SOP and POS

POS -> SOP : Use the following properties

P8b. $a + bc = (a + b)(a + c)$

P14a. $ab + a'c = (a + c)(a' + b)$

P8a. $a(b + c) = ab + ac$

SOP -> POS reverse order