

CoE/EE460 Switching Theory

Lecture 5

Washington University
Spring 2001

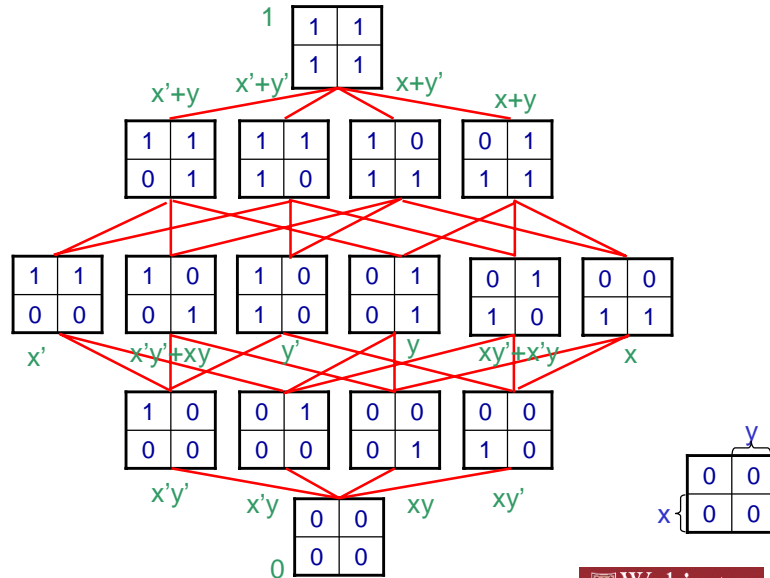
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Don't Care Conditions

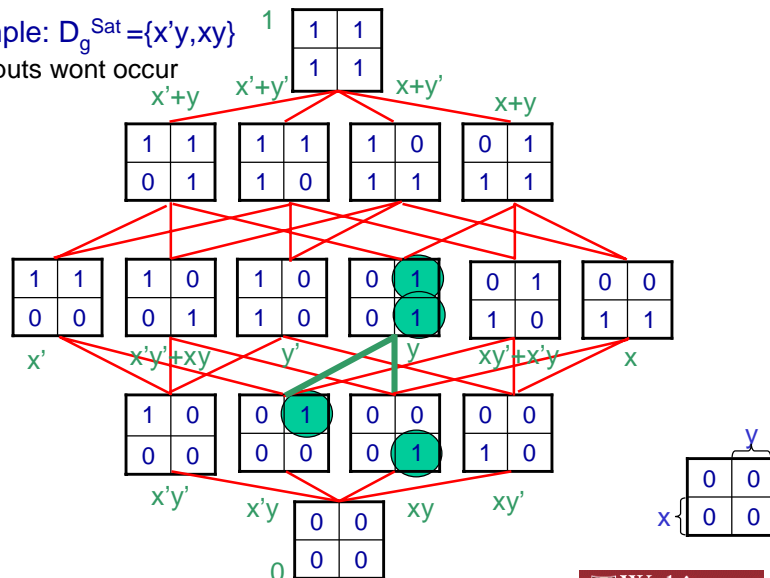
- Interval $[L, U]$
 - $[L, U] = \{ x \in B : L \leq x \leq U \}$
 - Example: $x=u'$; $y=0$; $g = x \text{ xor } y = x'y + xy'$ (p.104)
- Satisfiability Don't Care : D^{Sat}_g
 - Certain input combinations don't occur
 - Example: $D^{\text{sat}}_g = \{ x'y, xy \}$ never occur
- $D^{\text{sat}}_L = g - D^{\text{sat}} =$ On conditions less Never occurring conditions
 $= \{ xy', x'y \} - \{ x'y, xy \}$
- $D^{\text{sat}}_U = g \cup D^{\text{sat}} =$ On conditions \cup Never occurring conditions
 $= \{ xy', x'y \} \cup \{ x'y, xy \} = \{ xy' + x'y + xy \} = x + y$

Satisfiability and Observability



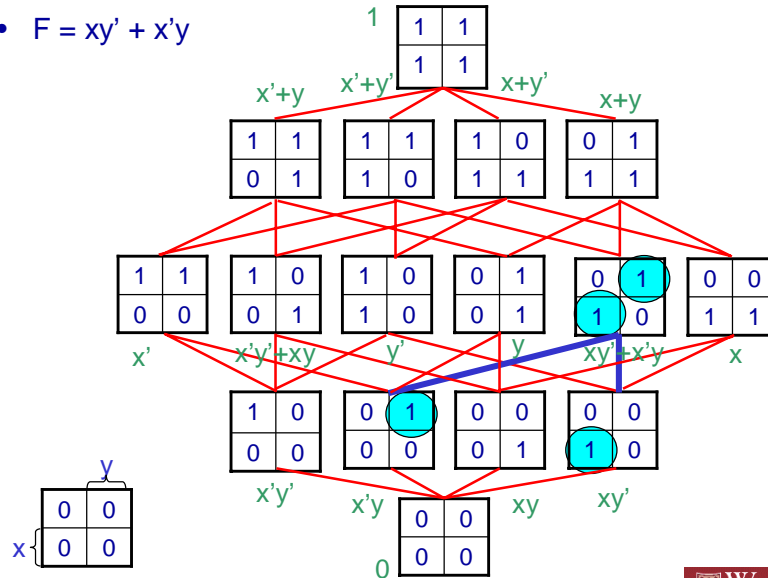
Satisfiability Don't Care – Example

- Example: $D_g^{\text{Sat}} = \{x'y, xy\}$
 – Inputs won't occur



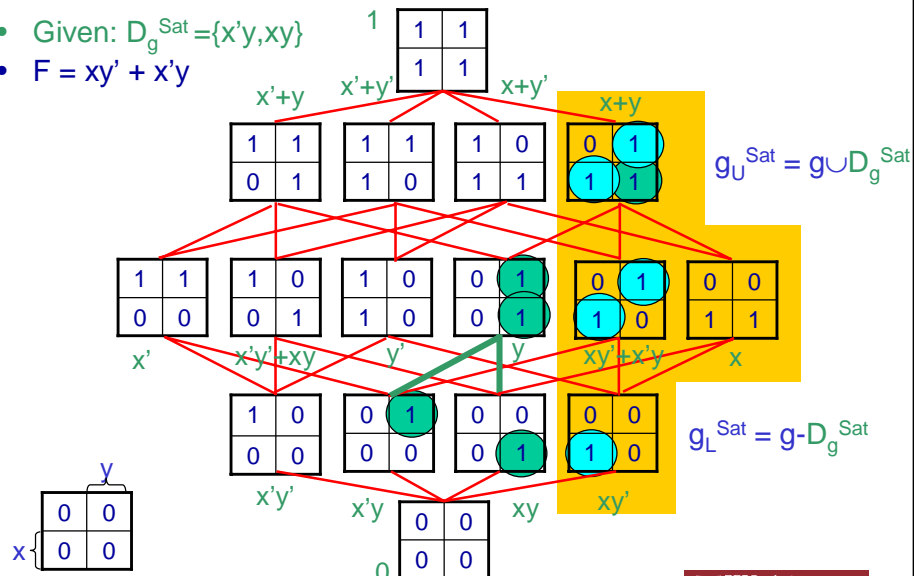
Satisfiability Don't Care – Example (2)

- $F = xy' + x'y$



Example:

- Given: $D_g^{Sat} = \{x'y, xy\}$
- $F = xy' + x'y$



Incomplete Specification: Boolean Function

- $ff = (f,d,r)$
 - $f = \text{ON-set} : f=1$ for all values of $ff=1$
 - $d = \text{Don't Care} : d=1$ for all values of $ff=d$
 - $r = \text{OFF-set} : r=1$ for all values where $ff=0$
- Relationships of ff to Interval $I=[L,U]$
 - $f = L$
 - $r = U'$
 - $d = U-L = UL' = (f+r)'$
 - $L = f$
 - $U = f+d$

Examples

- Given Interval $I=[0,x+y+z']$ for $B=\{0,1\}$, find $ff=(f,r,d)$
 - $L = 0$ (given)
 - $U = x+y+z'$ (given)
 - $f = L = 0$
 - $r = U' = x'y'z$
 - $d = UL' = x + y + z'$