

EE 200- Digital Logic Circuit Design

2.5 Boolean Functions.

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September 19, 2013



Entry Questions

- How to get the dual of a Boolean function?
- How to get the complement of a Boolean function?



Objectives

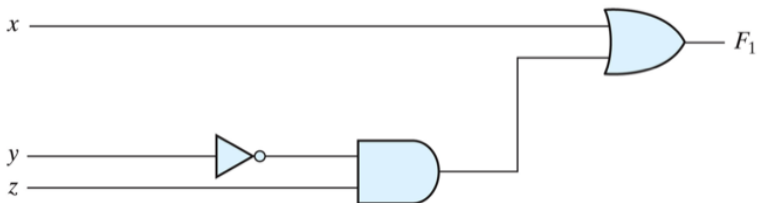
- 1 Boolean Functions
 - Algebraic Manipulation
 - Complement of a Function



Boolean Functions

- Implement the function using logic gates:

$$F_1 = x + y'z$$





Boolean Function Manipulation (Simplification)

- $x \cdot (x' + y) =$

xy

- $x + x' \cdot y =$

$x+y$

- $(x + y)(x + y') =$

x

- $x \cdot y + x' \cdot z + y \cdot z =$

$xy + x'z$



Complement of a Function

The complement of a Boolean function may be obtained by either one of two methods:

- Repetitive application of DeMorgan's theorem.
- Taking the dual of the function and complementing each literal.

Example: $F = x' \cdot y \cdot z' + x' \cdot y' \cdot z$

1 Method 1:

$$F' = (x' \cdot y \cdot z' + x' \cdot y' \cdot z)'$$

$$F' = (x' \cdot y \cdot z')' \cdot (x' \cdot y' \cdot z)'$$

$$F' = (x+y+z) \cdot (x+y+z')$$

2 Method 1:

$$F^D = (x'+y+z') \cdot (x'+y'+z)$$

$$F' = (x+y'+z) \cdot (x+y+z')$$



Summary

- 1 Boolean Functions
 - Algebraic Manipulation
 - Complement of a Function



Next Lecture

- Canonical and Standard Forms.