**Review of Wednesday’s Lecture**

**Principle of Duality** Any theorem or identity in switching algebra remains true is 0 & 1 and “·” and “+” are swapped though out. Ex.  $A \cdot A' = 0 \iff A + A' = 1$

**Switching Function** Mapping from binary n-tuples to {0,1}. An n-tuple is an ordered set of n numbers (BCD)

How to specify switching function?
- Truth table – impractacle for large n
- Convey function algebraically

**Literal** Variable or a complement of a variable (X, X’, Y)

**Product Term** Single literal or a product of literals (a, abc’)

**Sum of Products Expression (SOP)** Logical sum of two or more products (ab + cd)

**Sum term** Single literal or a sum of literals (a, a+b+c)

**Product of Sums Expression (POS)** Logical product of two or more sums (a+b+c)(a+b’)

**Normal Term** a product or sum term in which no variable appears more than once (wxy or w+x’y+y)

**n-variable Minterm** a normal product term with all n literals. (4-variable minterm: w’xyx’)

**n-variable Maxterm** a normal sum term with all n literals. (4-variable maxterm: w+x+y’+z)

A **minterm (maxterm)** is a **product (sum)** term that is 1(0) in exactly one row of the truth table

**Canonical Sum (Product)** of a logic function is the sum (product) of the minterms (maxterms) corresponding to the truth table rows where the function is equal to 1 (0)

**Canonical Sum**

$$F = x'y'z + x'yz' + xy'z$$

$F = ?_{x,y,z}(1, 2, 5)$

is also called a minterm list

**Canonical Product**

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

$F = ?_{x,y,z}(0,3,4,6,7)$

is also called a maxterm list

Conversion between the two is easy

$?_{a,b,c}(0,1,2,3) = ?_{a,b,c}(4,5,6,7)$

Now have 5 ways to represent a combinational logic function:
1) A truth table
2) An algebraic sum or minterms, the canonical sum
3) A minterm list using the ? notation
4) An algebraic product of maxterms, the canonical product
5) A maxterm list using the ? notation