Computer Systems Design

Week 2

Combinational logic:

It is memoryless and output is strictly dependent on the current input values.

Sequential logic:

It has a memory and output is dependent on the current input and stored value.

Function:

It is unique, not ambiguous and is not dependent on memory.

Boolean Algebra:

It is the NOT, AND, OR stuff.

$$Distributive\ Laws:$$
$$a + (b * c) = (a + b) * (a + c)$$
$$AND$$
$$a * (b + c) = (a * b) + (a * c)$$

Rest rules are normal algebra.

Duality:

A dual of a boolean expression is made by:

- replacing AND with OR
- replacing OR with AND
- replacing constant 1s with 0s
- replacing constant 0s with 1s

A boolean expression is EQUAL to its dual version.

We can simplify equations and expressions by moot substitution.

DeMorgans's Law:

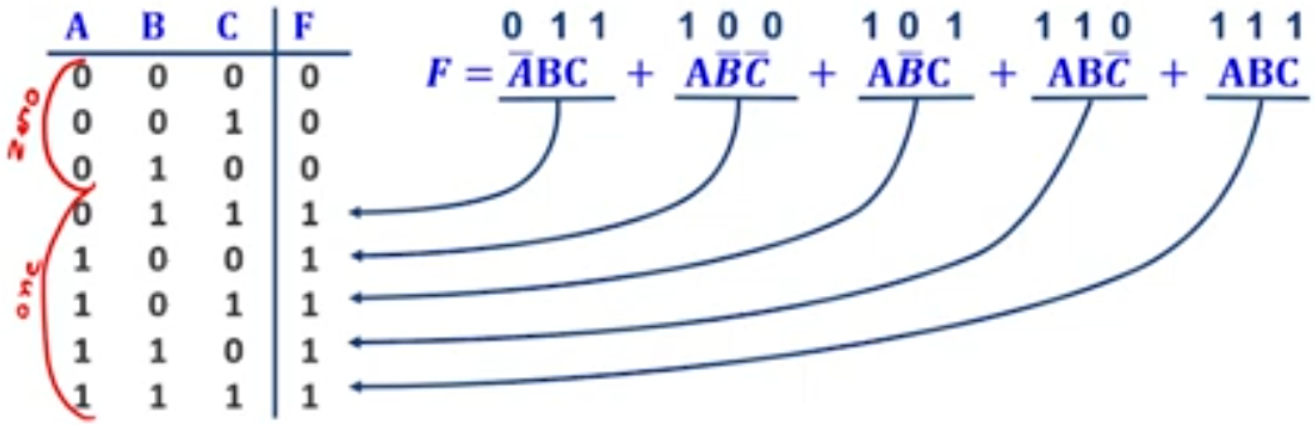
$$\overline{a * b * c...} = \bar{a} + \bar{b} + \bar{c} + ...$$
$$\overline{a + b + c...} = \bar{a} * \bar{b} * \bar{c} * ...$$

Sum of Products:

This is a way to express a function in standard terms.

- We only keep combinations that result in 1

Now the function is a OR of all input combinations that result in a 1.



Normalized minterm.

Impicant:

It is AND of some literals.

Minterm:

It is AND that includes all literals.

$\sum m(1, 3, 4, 7)$ means u make the truth table for the inputs and take the 2nd, 4th .. values and ADD(+) them up

Maxterm:

It is OR that includes all literals.

Operator precedence:

- NOT (-)
- AND (*)
- OR (+)

Canonical form:

It is a standard way to express with a unique algebraic signature.

Product of sum is just reversed SOP:

You take where there is 0 and ignore 1. If literal is 1 then it is bar.

END OF WEEK 2
