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M 9 - 10 am
W 10 - 11 am
RM EBU1 - 1506
2-level AND-OR from SOP / Sum-of-products

\[ F(A, B, C) = \sum_m (1, 4, 5, 6, 7) \]

1 - 3 input OR gate \( \sum_{SOP} \)

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Simplify
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\[ = \overline{A} (B + \overline{B}) \cdot (C + \overline{C}) = A \cdot 1 \cdot 1 = A \]

"Smarter"
Functions can be implemented with a variety of logic networks.

Optimize for a variety of purposes:
1) size
2) delay
3) power

K-Map:

3-variable Karnaugh Map

4-variable Karnaugh Map

Adjacent cells differ by at most 1 bit, columns and rows wrap around.

\( m(1, 3, 5, 7) \)

\[ \overline{BC} + \overline{A}BC + \overline{A}BC + \overline{A}BC \]
To find subcubes look for adjacent squares.

Subcubes in a 4x4 KMN:

- Subcubes of size 1
- Subcubes of size 2
- Subcubes of size 3
- Subcubes of size 4

All of the shapes drawn above may be rotated as necessary in a set of 4.
The shape of the subcubes are set of $d$ such that some combination of inputs for each variable in $d$ is included in the subcube. (This is 1 if $d < 1$ of acceptable shapes for a subcube.)

Simplify $F = \Sigma_m (0, 2, 4, 5, 6, 7, 8, 10, 13, 15)$

A product term obtained by combining the maximum possible number of adjacent squares in a Kmap.

An implicant is a prime implicant if it doesn't contain any other implicant.

Essential Prime Implicant
at least one '1' that is not covered by any other prime implicant.