

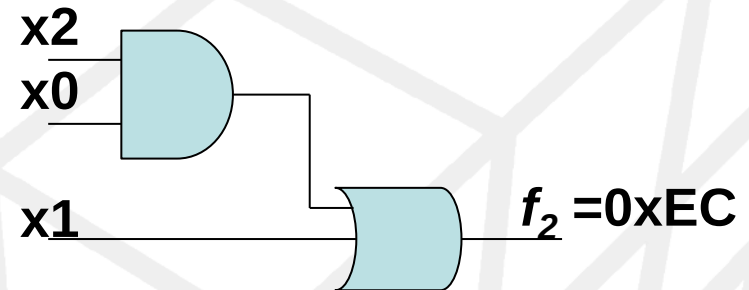
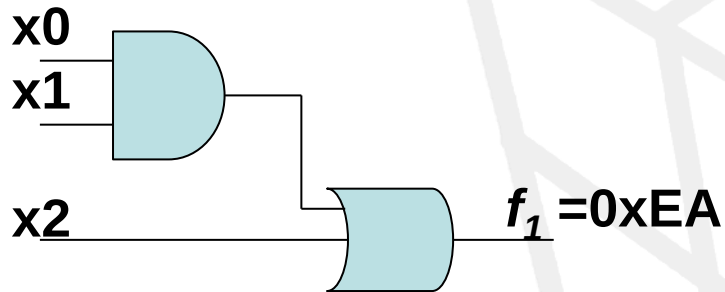
P-matching method based on bipartite graph

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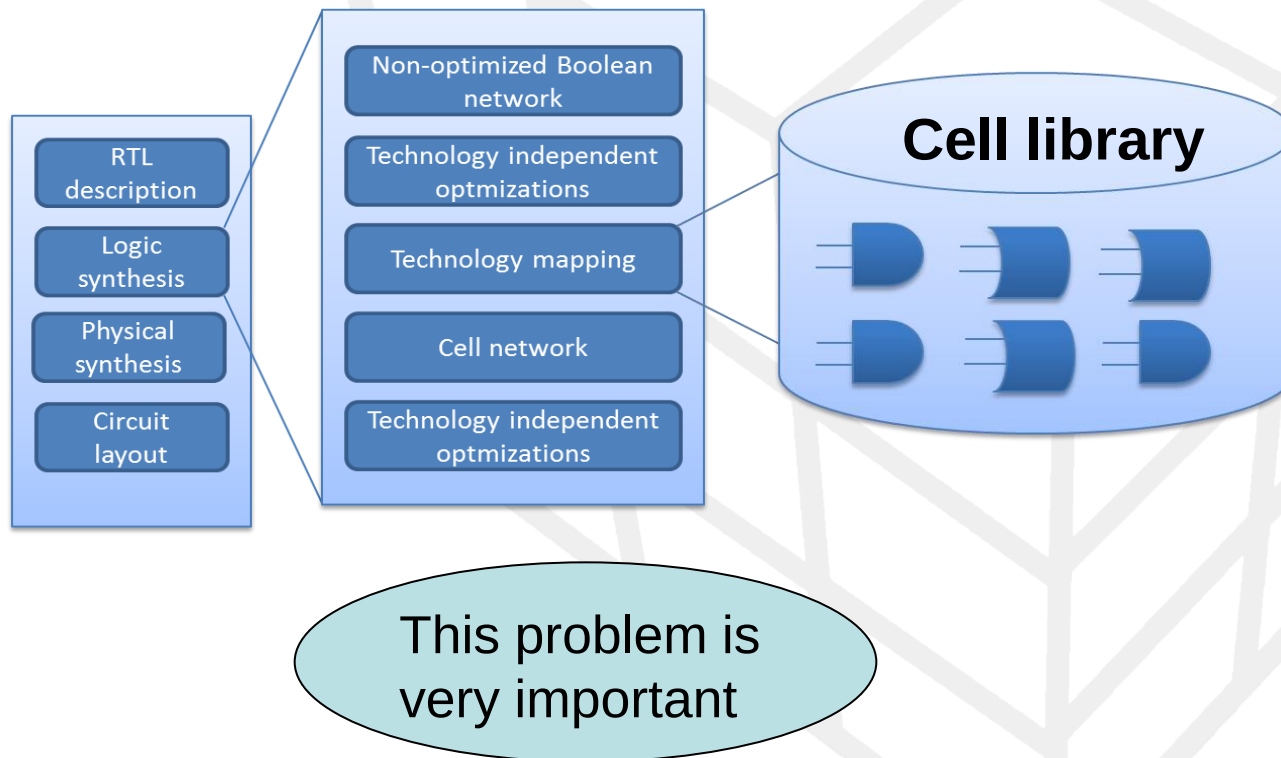
- Boolean Matching
 - More specifically, P-Matching



- How we find an mapping of f_1 inputs with f_2 inputs?
 - In general, there are $n!$ possibilities, where n is the number of variables of the functions.

Why P-Matching is interesting?

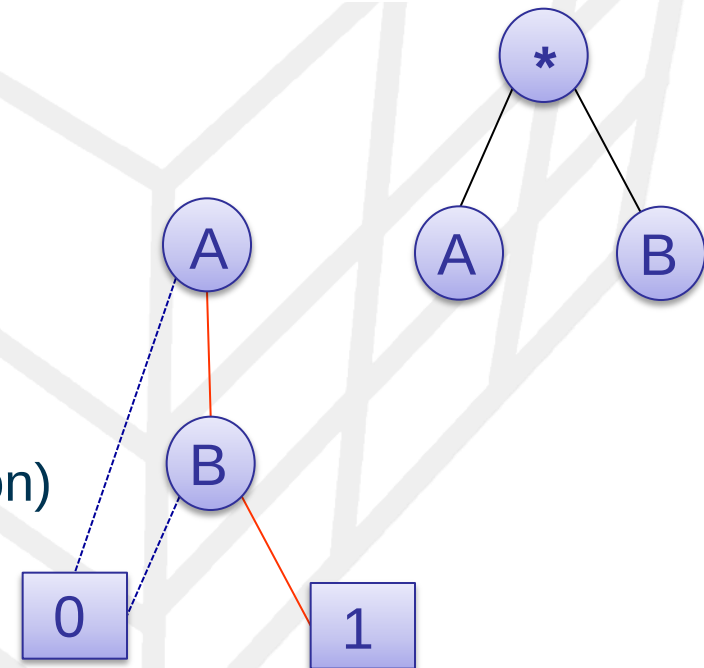
- Because is used in technology mapping
 - That is a step of Logic Synthesis in standard cell approach



As the P-matching has been solved...

- Truth table
 - Variable permutations implies column permutations
- Expressions (tree)
 - Variable permutations implies literals permutations
- BDD
 - Variable permutations implies nodes permutation (and BDD reconstruction)

A	B	F
0	0	0
0	1	0
1	0	0
1	1	1



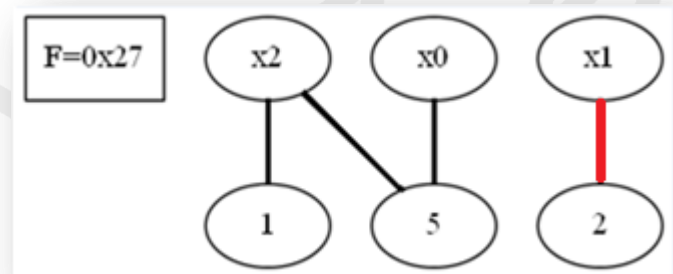
There is an structure associated with Boolean function that favours Boolean matching permutations?

- Yes!

Graph Minterm-Variable

	X0	X1	X2	f
0:	0	0	0	1
1:	0	0	1	1
2:	0	1	0	1
3:	0	1	1	0
4:	1	0	0	0
5:	1	0	1	1
6:	1	1	0	0
7:	1	1	1	0

	X0	X1	X2	f
0:	0	0	0	1
1:	0	0	1	1
2:	0	<u>1</u>	0	1
3:	1	0	1	1



Any permutation, in column or line of original truth-table, do not modifies the associated graph ☺

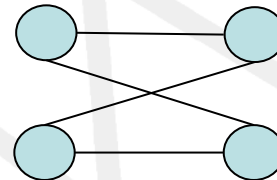
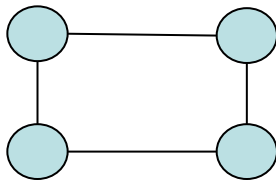
So, this is the structure that we were looking for!

Then... P-Matching is solved! Any P-equivalent function will be the same graph minterm-variable associated.

– Not!

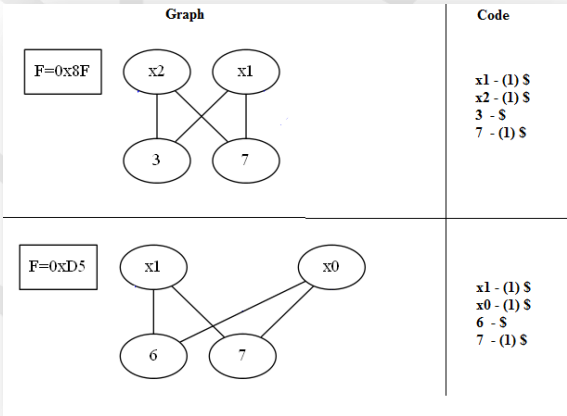
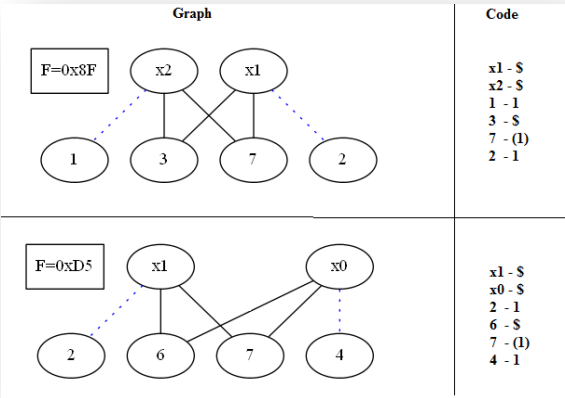
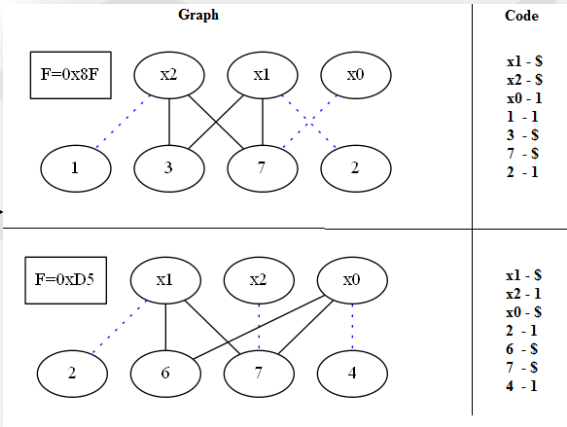
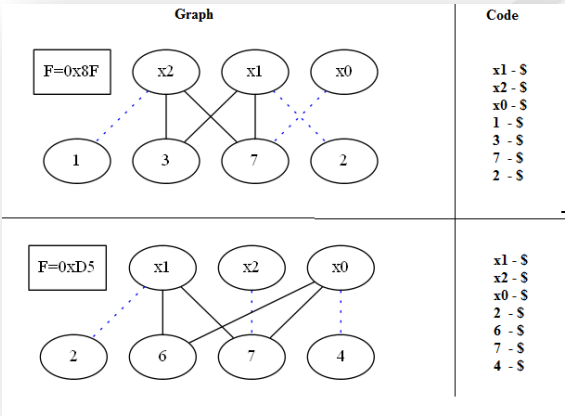
We fell into a graph problem named **graph isomorphism**

– Ex:

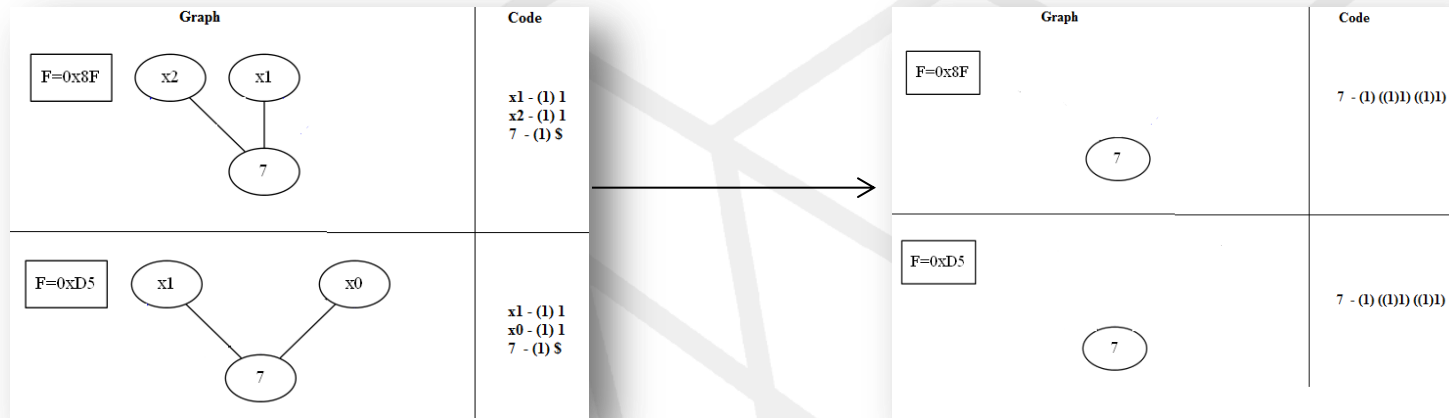


- Is the same graph, but are drawn in different form
 - It is easy to check isomorphism? Not Known!
 - In general, this is an open problem in computer science
- To Graph Minterm-Variable, this problem is easy 😊

 The basic idea is reduce both graphs

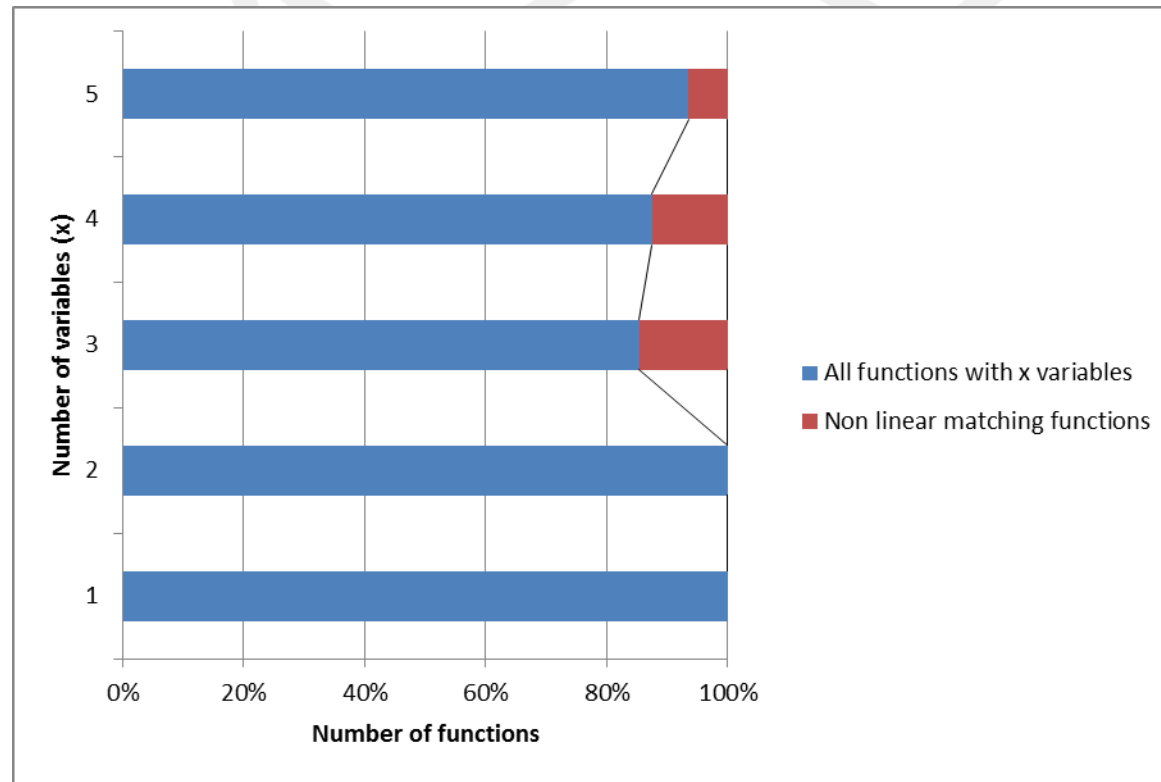


- The basic idea is reduce both graphs



- These graph are P-equivalent.
 - If not, a intermediate code will disagree or the graph do not will be empty in the last step.

❏ The algorithm has been validated with the generation of P-class with 2-, 3- and 4-input functions. This step validates the correctness of algorithm



Thank you!

<http://www.inf.ufrgs.br/logics>