Assignment 1 | FPGA Lab

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1 Question

Reduce the following Boolean Expression to its simplest form using K-Map :
F(A,B,C,D) = $\sum(0, 2, 3, 4, 5, 8, 10, 11, 12, 13)$

2 Solution

2.1 KMAP Implementation

Given SOP expression can be minimized using a KMap (Figure 1).

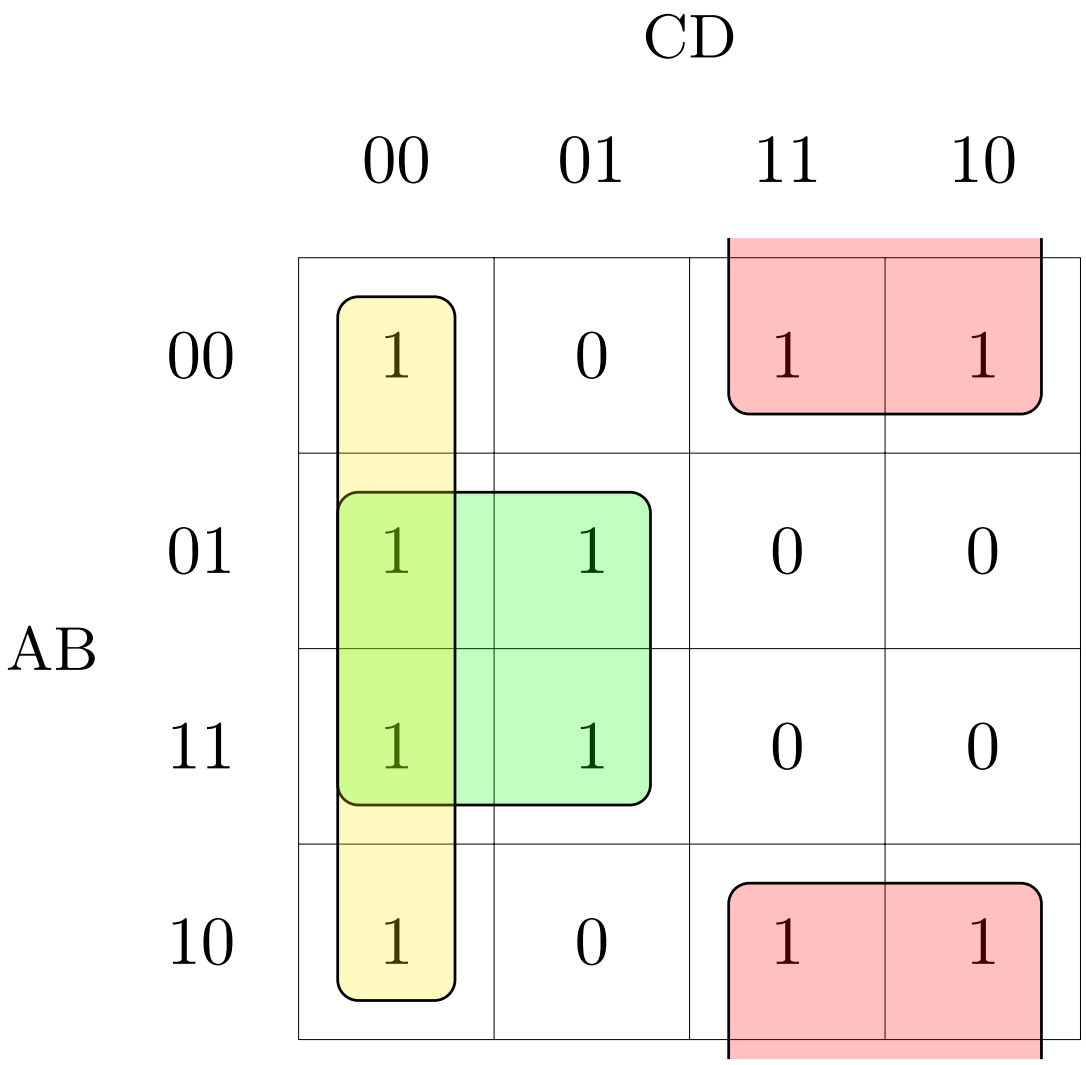

Figure 1: SOP for F

2.2 Minimized SOP Expression

$Y = \overline{C}.\overline{D} + B.\overline{C} + B.C = B(C + \overline{C}) + \overline{C}.\overline{D} = B + \overline{C}.\overline{D}$

2.3 NAND Logic Implementation

To implement it using NAND Logic, we convert the simplified SOP expression to suite the NAND logic, which gives :

$$Y = \overline{\overline{B}.\overline{\overline{C}.D}}$$

The last expression can be implemented using only two input-NAND Gates.