

Problem

Fill in the following table to show the values of all possible two-place Boolean functions.

Input	f_1	f_2	f_3	f_4	f_5	f_6	f_7	f_8	f_9	f_{10}	f_{11}	f_{12}	f_{13}	f_{14}	f_{15}	f_{16}
1 1																
1 0																
0 1																
0 0																

Step-by-step solution

Step 1 of 2

Consider the table shown below:

Input	f_1	f_2	f_3	f_4	f_5	f_6	f_7	f_8	f_9	f_{10}	f_{11}	f_{12}	f_{13}	f_{14}	f_{15}	f_{16}
1 1																
1 0																
0 1																
0 0																

Step 2 of 2

Objective is to fill the above table to show the values of all possible two-places Boolean functions.

Note that, each Boolean function can be represented as a union of [complete products](#) uniquely. It follows that there are 2^{2^p} inequivalent Boolean functions for a set A having p elements.

Two-place Boolean function resembles the operation of two valued electric switching circuits. There are $2^{2^2} = 16$ possible Boolean functions whose truth table is shown below.

Input	f_1	f_2	f_3	f_4	f_5	f_6	f_7	f_8	f_9	f_{10}	f_{11}	f_{12}	f_{13}	f_{14}	f_{15}	f_{16}
1	1	0	1	0	0	0	1	1	1	0	0	1	1	1	0	0
1	0	0	0	1	0	0	1	0	0	1	0	1	1	0	1	1
0	1	0	0	0	1	0	0	1	0	0	1	1	0	1	1	1
0	0	0	0	0	0	1	0	0	1	1	1	0	1	1	1	0