Programmable Logic Array (PLA)

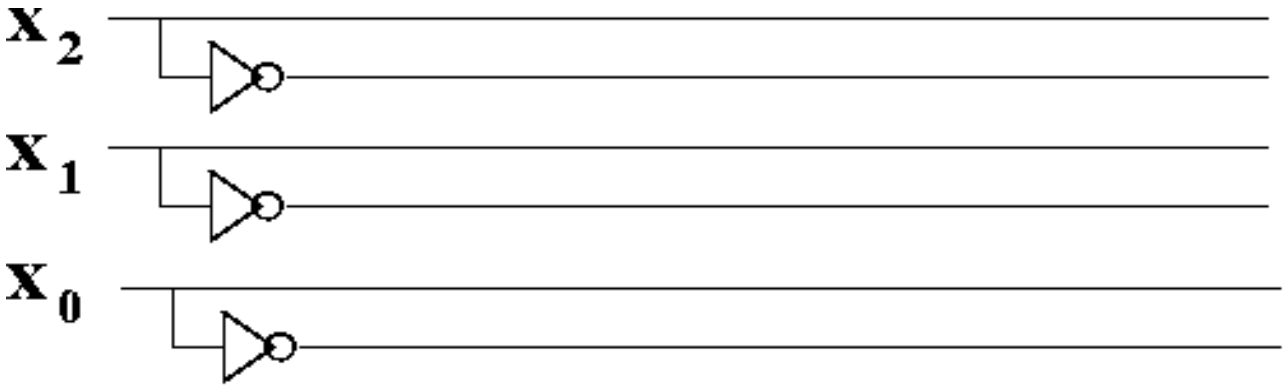
Implementing combinational circuits

Boolean functions ---> gates

Programmable logic array (PLA)

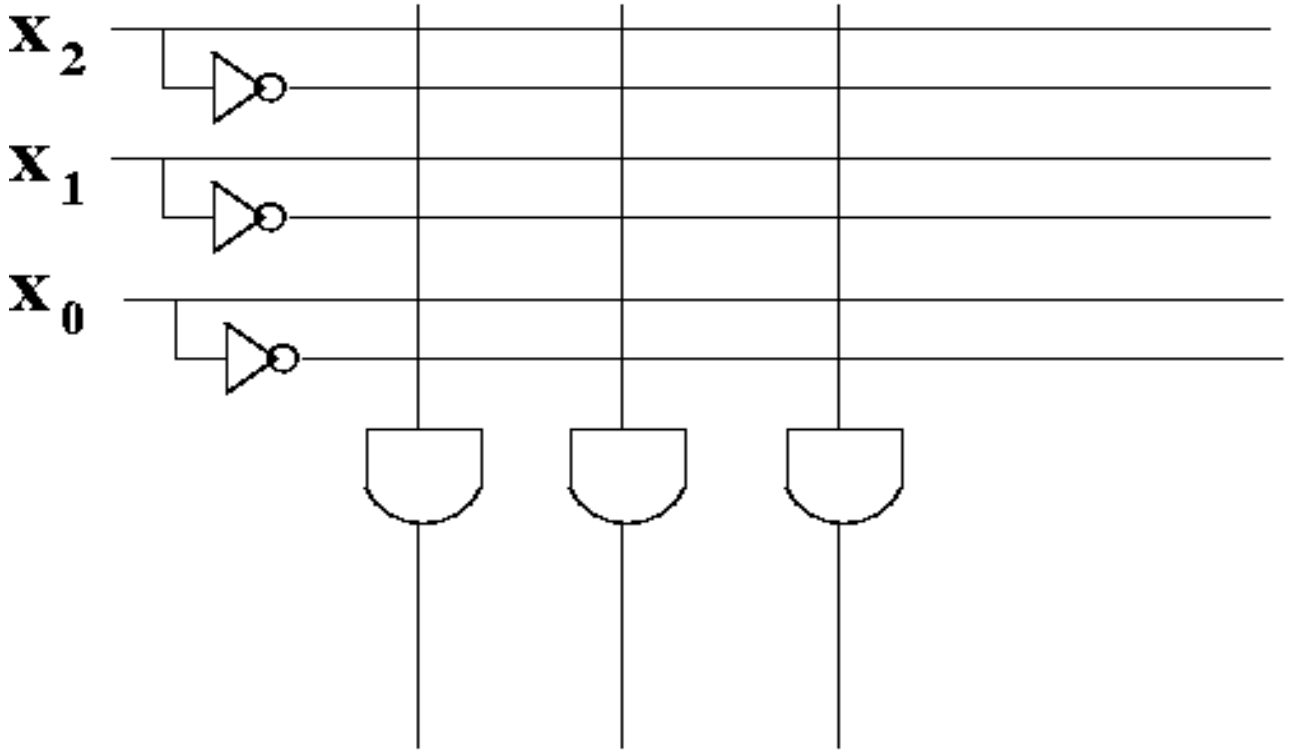
More general implementation

Start with all inputs and their negations:



Programmable Logic Array (PLA)

Add a set of AND gates with perpendicular connections (3 in this case):



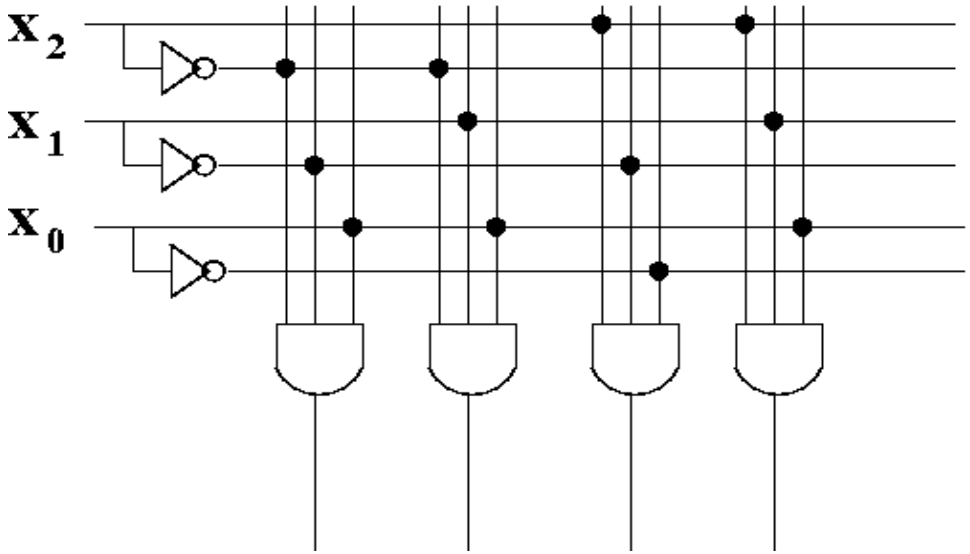
Programmable Logic Array (PLA)

Implement a truth table:

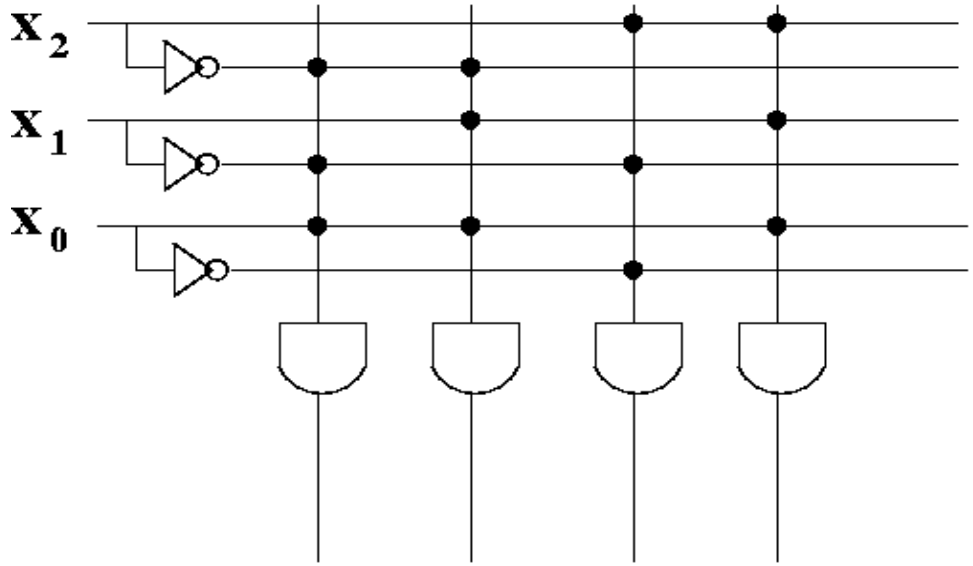
x_2	x_1	x_0	z_1	z_0	Minterms
0	0	0	0	0	
0	0	1	1	0	$\backslash x_2 \backslash x_1 x_0$
0	1	0	0	0	
0	1	1	1	0	$\backslash x_2 x_1 x_0$
1	0	0	1	1	$x_2 \backslash x_1 \backslash x_0$
1	0	1	0	0	
1	1	0	0	0	
1	1	1	0	1	$x_2 x_1 x_0$

Connect the necessary inputs to each AND gate in order to contruct the minterms:

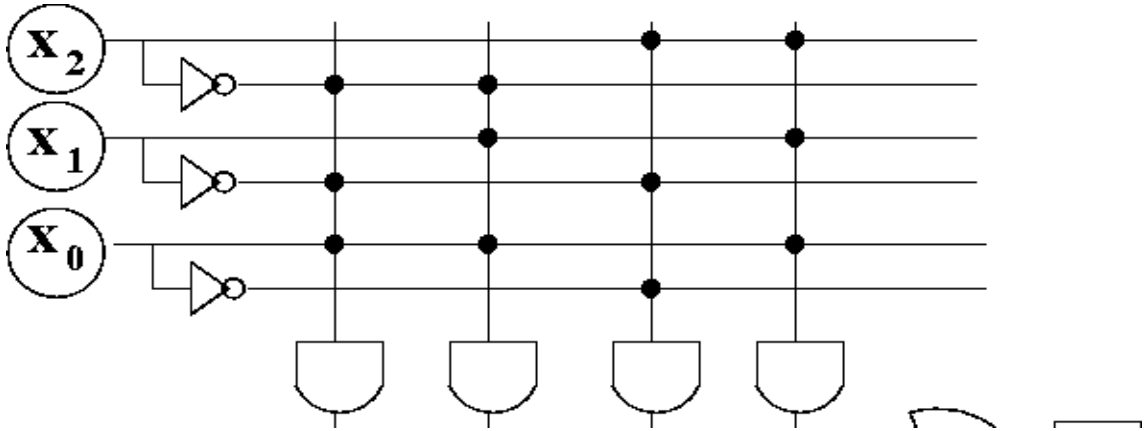
Dots indicate connections

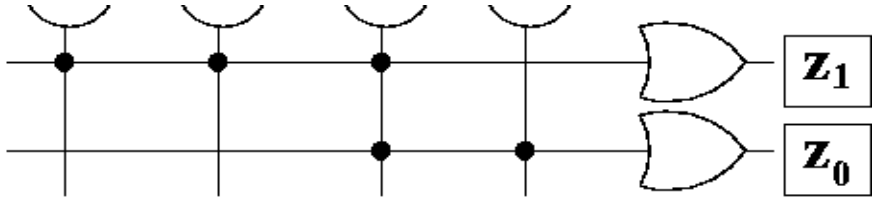


This can be simplified by combining the inputs for each AND gate:



Now add OR gates to combine the minterms:

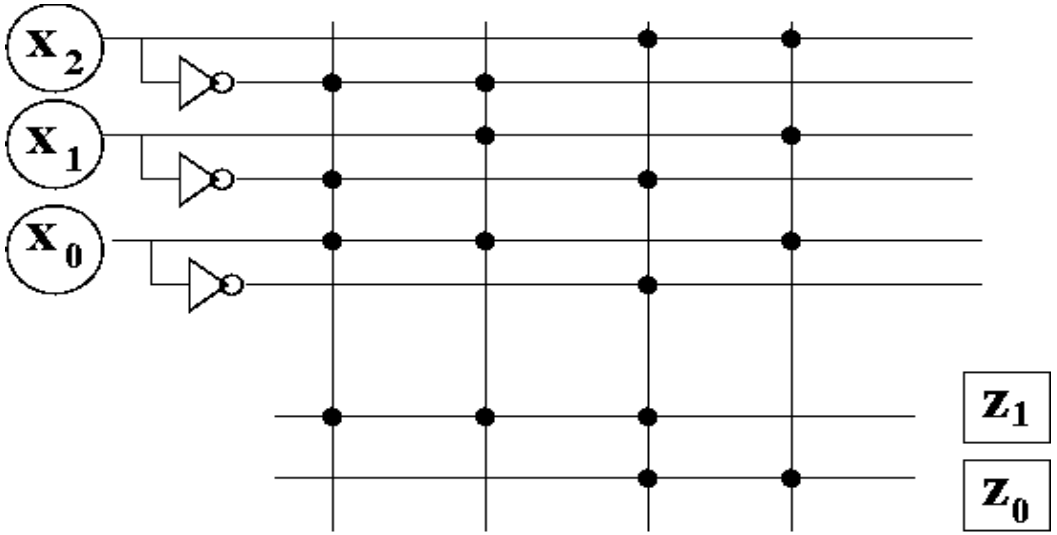




The vertical lines are called the AND plane

The horizontal lines are called the OR plane

We can simplify the picture even further by eliminating the gates themselves:



Programming the PLA:

Make the connections represented by the black dots