Test 6

All problems worth 25 points. Label all inputs and outputs.

1. For the following functions, implement them on the ROM below.

f

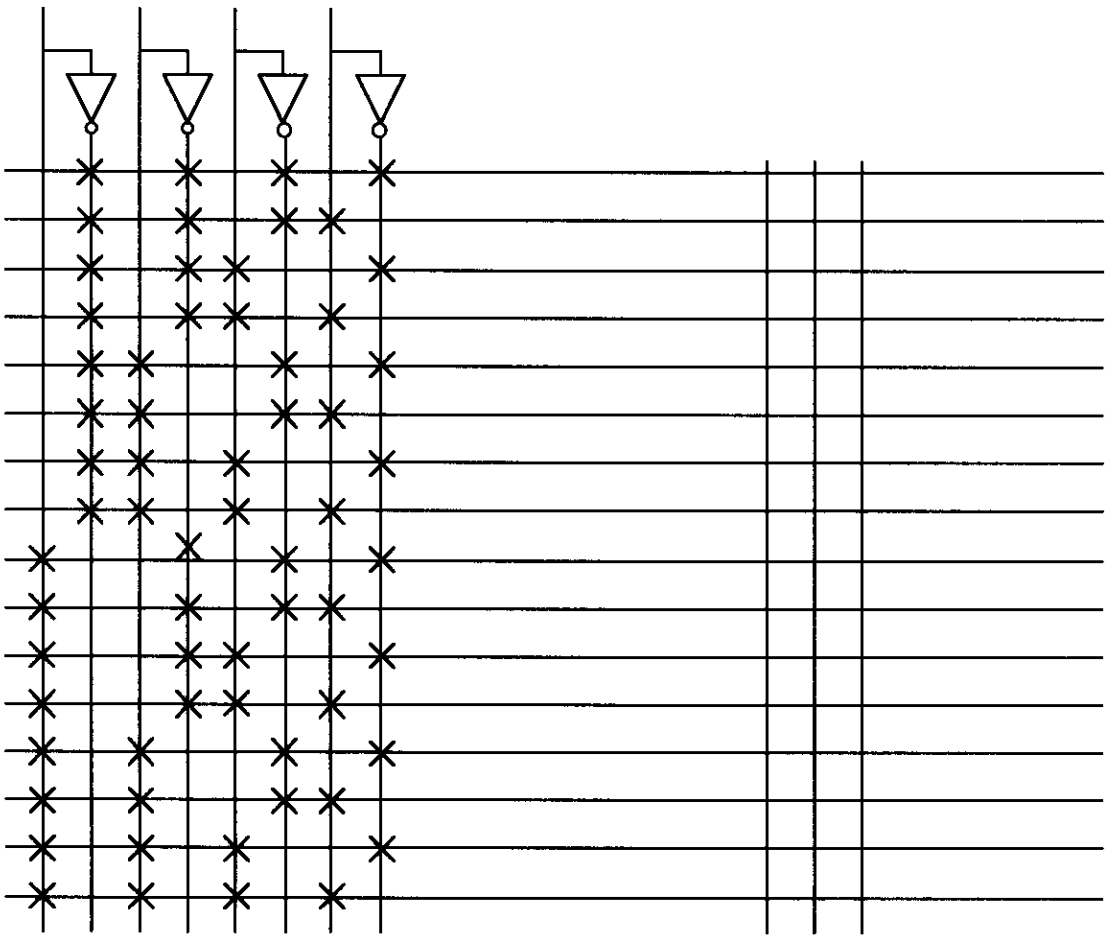
c d \ a b	00	01	11	10
00		1	1	
01		1	1	1
11	1	1	1	1
10				

g

c d \ a b	00	01	11	10
00		1	1	
01		1	1	1
11	1	1	1	1
10		1	1	

h

c d \ a b	00	01	11	10
00	1	1	1	1
01				1
11				1
10	1			1



2. Implement the same function with the PAL below (maps repeated). Circle the terms on the maps and show the algebraic expression you are implementing.

f

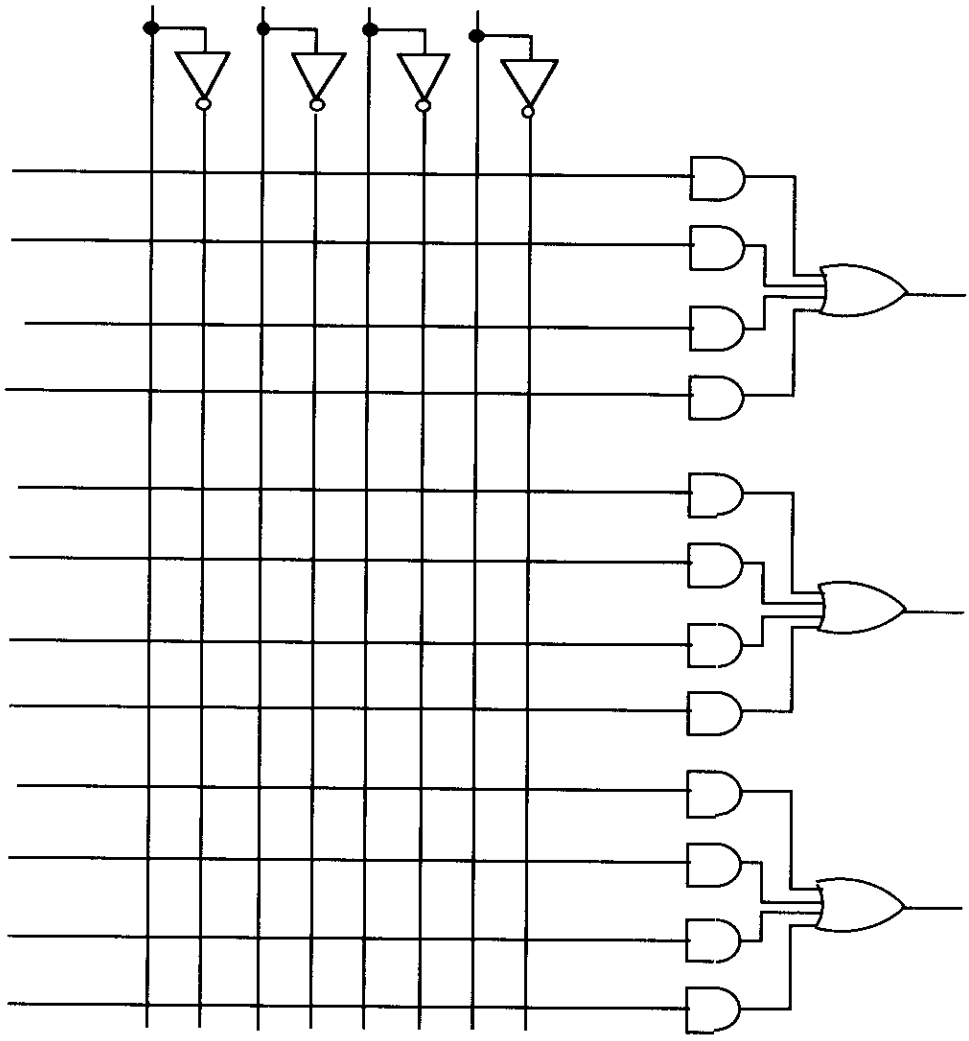
c d \ a b	00	01	11	10
00		1	1	
01		1	1	1
11	1	1	1	1
10				

g

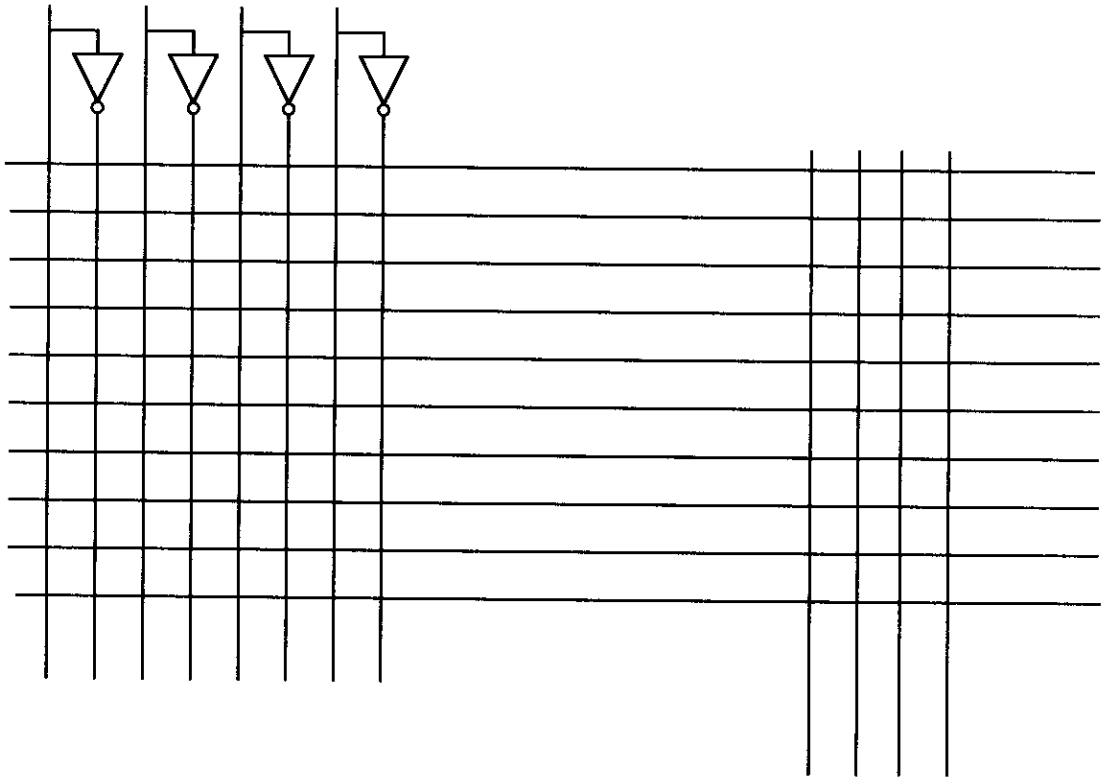
c d \ a b	00	01	11	10
00		1	1	
01		1	1	1
11	1	1	1	1
10		1	1	

h

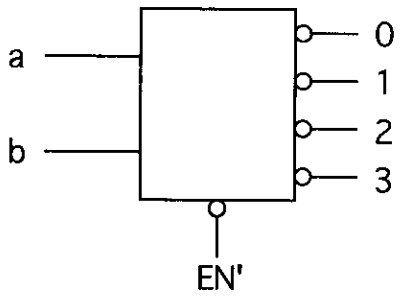
c d \ a b	00	01	11	10
00	1	1	1	1
01				1
11				1
10	1			1



3. For the same function, implement it on the PLA shown below. Circle the terms on the maps and show the algebraic expression you are implementing. Full credit if you can fit it on the PLA using only 6 AND gates.



4. Implement the same function using three NAND gates (as many inputs as necessary) and as many of the decoders described below as necessary. There are no other gates available.



EN'	a	b	0	1	2	3
1	X	X	1	1	1	1
0	0	0	0	1	1	1
0	0	1	1	0	1	1
0	1	0	1	1	0	1
0	1	1	1	1	1	0

5-point Bonus: Show a new design using three 4-input NAND gates (but you may use more decoders).