

Encoder

$2^n \rightarrow n$

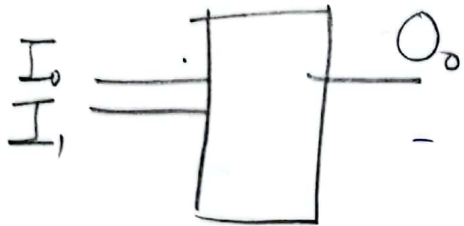


2×1

8×3

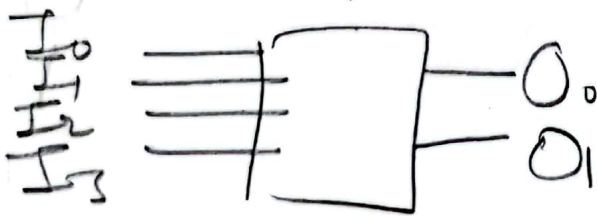
16×4

2×1



$$I_0 \quad I_1 \quad / \quad O_0 \quad O_0 = \bar{I}_0 I_1$$

$$\begin{array}{c} 0 \quad 1 \\ 1 \quad 0 \end{array} / \begin{array}{c} 1 \\ 0 \end{array} \quad O_0 = I_1 \text{ (priority)}$$

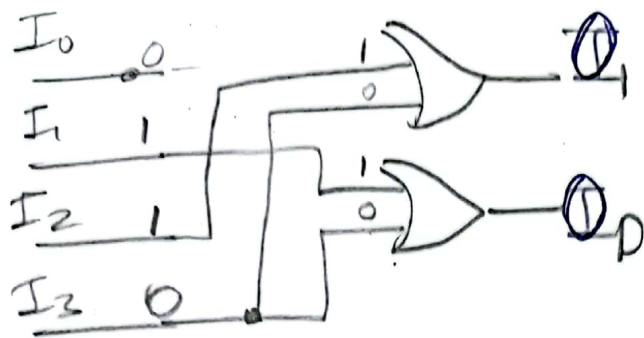


I_0	I_1	I_2	I_3	O_1	O_0	\vee	
1	0	0	0	0	0	1	$O_0 = I_1 + I_3$
0	1	0	0	0	1	1	$O_1 = I_2 + I_3$
0	0	1	0	1	0	1	
0	0	0	1	1	1	1	
0	0	0	0	x	x	0	

$$\vee = I_0 + I_1 + I_2 + I_3$$

If we press 2 together

2



If we press two buttons together I_1, I_2 output will be $O_0 = 1$ $O_1 = 1$ wrong!

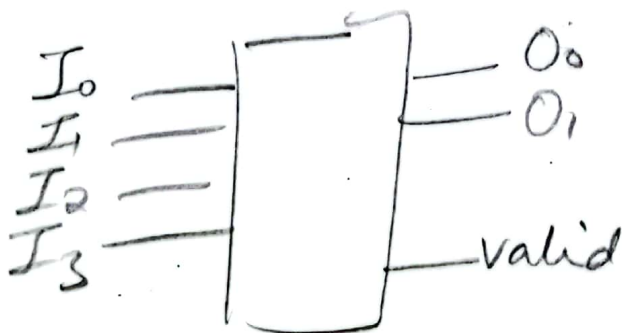
old mobile keypad

- high priority \rightarrow 2 output
- low priority \rightarrow 1 output

Priority Encoder 4×2

$I_0 < I_1 < I_2 < I_3 \rightarrow$ high

$I_0 > I_1 > I_2 > I_3 \rightarrow$ low



$I_0 < I_1 < I_2 < I_3$						
1	0	0	0	0	0	1
X	1	0	0	0	0	1
X	X	1	0	0	0	1
X	X	X	1	0	0	1

— Kones reduce the number of rows in the truth table

3

$X \rightarrow$ two rows
 $XX \rightarrow$ 4 rows
 $XXX \rightarrow$ 8 rows

— K Map for O_1

		$I_2 I_3$			
		00	01	11	10
$I_0 I_1$	00	X	1	1	1
	01	0	1	1	1
	11	0	1	1	1
	10	0	1	1	1

$$O_1 = I_3 + I_2$$

— K Map for O_0

		$I_2 I_3$			
		00	01	11	10
$I_0 I_1$	00	X	1	1	0
	01	1	1	1	0
	11	1	1	1	0
	10	0	1	1	0

$$O_0 = I_3 + I_1 \bar{I}_2$$

$$V = I_0 + I_1 + I_2 + I_3$$

Low Priority

4

$$I_0 > I_1 > I_2 > I_3$$

	I_0	I_1	I_2	I_3	Q_1	Q_0	V
0	0	0	0	0	X	X	0
1	X	X	X	X	0	0	1
0	1	X	X	X	0	1	1
0	0	1	X	X	1	0	1
0	0	0	1	X	1	1	1

$I_0 I_1$	$I_2 I_3$			
	00	01	11	10
00	X	1	1	1
01	0	0	0	0
11	0	0	0	0
10	0	0	0	0

K-map
for Q_1

$$Q_1 = \bar{I}_0 \bar{I}_1 I_3 + \bar{I}_0 \bar{I}_1 I_2$$

K Map for O_0 (5)

		$I_2 I_3$	00	01	11	10
$I_0 I_1$	00	X	1	0	0	
	01	1	1	1	1	
	11	0	0	0	0	
	10	0	0	0	0	

$$O_0 = \bar{I}_0 I_1 + \bar{I}_0 \bar{I}_2 I_3$$

→ Order can be changed - custom

I_1	I_2	I_0	I_3
0	0	0	0
1	X	X	X
0	1	X	X
0	0	1	X
0	0	0	1

O_1	O_0	V
X	X	0
0	1	1
1	0	1
0	0	1
1	1	1

		$I_0 I_3$	00	01	11	10
$I_1 I_2$	00	X	1	0	0	
	01	1	1	1	1	
	11	0	0	0	0	
	10	0	0	0	0	

$$O_1 = \bar{I}_1 I_2 + \bar{I}_1 \bar{I}_0$$

		$I_0 I_3$				
$I_1 I_2$	00	01	11	10		
00	X	1	0	0		
01	0	0	0	0		
11	1	1	1	1		
10	1	1	1	1		

$$O_0 = I_1 + \bar{I}_2 \bar{I}_0$$