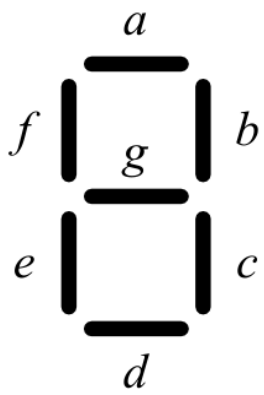
Task 1

Synthesize the circuit for a BCD to 7-segment decoder for driving a 7-segment LED display.

The decoder converts a 4-bit binary coded decimal (BCD) input to seven output signals for turning on the seven lights in a 7-segment LED display.

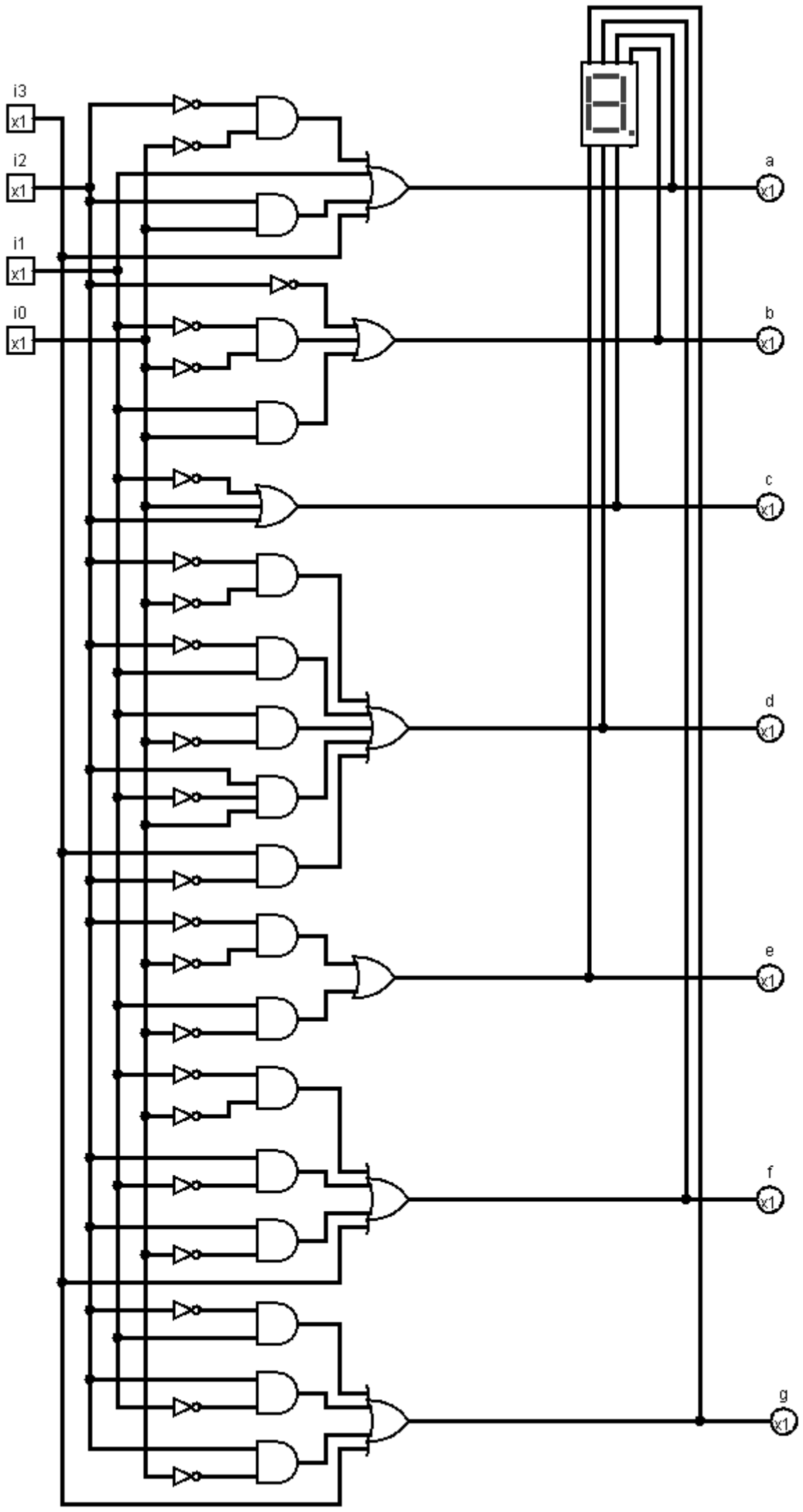


The truth table is

Inputs i_3	i_2	i_1	i_0	Decimal Digit	Display	a	b	c	d	e	f	g
0	0	0	0	0		1	1	1	1	1	1	0
0	0	0	1	1		0	1	1	0	0	0	0
0	0	1	0	2		1	1	0	1	1	0	1
0	0	1	1	3		1	1	1	1	0	0	1
0	1	0	0	4		0	1	1	0	0	1	1
0	1	0	1	5		1	0	1	1	0	1	1
0	1	1	0	6		1	0	1	1	1	1	1
0	1	1	1	7		1	1	1	0	0	0	0
1	0	0	0	8		1	1	1	1	1	1	1
1	0	0	1	9		1	1	1	1	0	1	1
rest of the combinations						×	×	×	×	×	×	×

Build the circuit from this table.

The circuit is shown in the next page.


i3
x1
i2
x1
i1
x1
i0
x1
a
x1
b
x1
c
x1
d
x1
e
x1
f
x1
g
x1

Task 2

Build each of the elementary logic gates (AND, OR, NOT, NAND, NOR, XOR, XNOR) from 2:1 multiplexers in Logisim