

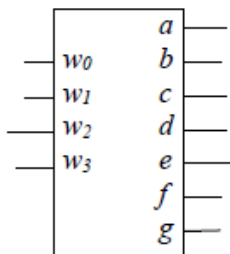
## Homework 1 Logisim Problems

For each of the following problems you have already been provided with a correctly named circuit to test your implementation. You should create your answer in the subcircuit that is already present. The name of a subcircuit is either part1, part2, or part3, depending on if you are working on question 1, 2, or 3. You may only use AND, OR, NOT, and XOR gates in your solution.

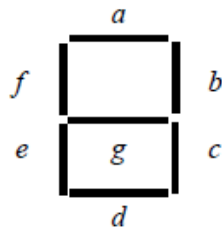
- (25 points) File name: **fun.circ**. Create the **simplest** circuit in Logisim that implements the following function:  $(x_1 * x_2 * \bar{x}_3) + (x_3 * x_4) + (x_1 * x_2 * \bar{x}_4)$
- (25 points) File name: **grey.circ**. Grey scale is an alternative method for representing binary numbers. The following truth table shows the mapping from binary to grey scale. Create the **simplest** circuit in Logisim that implements the following truth table.

X2	X1	X0	Grey Code
0	0	0	000
0	0	1	001
0	1	0	011
0	1	1	010
1	0	0	110
1	0	1	111
1	1	0	101
1	1	1	100

- (50 points) File name: **bcd.circ**. Given the following BCD-to-7-segment display, derive the minimal SOP function for the outputs, a, b, c, d, e, f, g of the 7-segment display, and then implement that function in Logisim.



Code converter



7-segment display

w3	w2	w1	w0	a	b	c	d	e	f	g
0	0	0	0	1	1	1	1	1	1	0
0	0	0	1	0	1	1	0	0	0	0
0	0	1	0	1	1	0	1	1	0	1
0	0	1	1	1	1	1	1	0	0	1
0	1	0	0	0	1	1	0	0	1	1
0	1	0	1	1	0	1	1	0	1	1
0	1	1	0	1	0	1	1	1	1	1
0	1	1	1	1	1	1	0	0	0	0
1	0	0	0	1	1	1	1	1	1	1
1	0	0	1	1	1	1	1	0	1	1