

Anushka Chougule  
 Homework #5  
 Feb 25, 2025

Q1-1 and Q1-2.

Q1.-1	$M = (a \oplus c)'$ $N = (b + d)'$ $P = (b' + M)' = (b' + (a \oplus c)')'$ $Q = (b' * N)' = (b' * (b + d))'$
	$x = P * Q = (b' + (a \oplus c)') * (b' * (b + d))'$ $x = (\overline{b} + (a \bar{c} + \bar{c} \bar{a})) * (\overline{b} \cdot (\overline{b} + d))$
Q1.-2	$x = b \cdot (\bar{c}c + a \cdot \bar{c}) (\overline{b} + \overline{b} \bar{d})$ $x = (\bar{a}bc + ab\bar{c}) \cdot (\overline{b} + \overline{b} \bar{d})$ $x = \bar{a}bc + ab\bar{c}$
	$\overline{A+B} = \bar{A} + \bar{B}$ $A=0$ $\overline{AB} = \bar{A} + \bar{B}$

Q2-1.

Inputs:

Outputs:

<b>x</b>	<b>y</b>	<b>z</b>	<b>A</b>	<b>B</b>	<b>C</b>
0	0	0	0	1	0
0	0	1	0	1	1
0	1	0	1	0	0
0	1	1	1	0	1
1	0	0	0	1	1
1	0	1	1	0	0
1	1	0	1	0	1
1	1	1	1	1	0

Q2-2.

A's K-Map

<b>z/xy</b>	<b>00</b>	<b>01</b>	<b>11</b>	<b>10</b>
<b>0</b>	0	1	1	0
<b>1</b>	0	1	1	1

B's K-Map

<b>z/xy</b>	<b>00</b>	<b>01</b>	<b>11</b>	<b>10</b>
<b>0</b>	1	0	0	1
<b>1</b>	1	0	1	0

C's K-Map

<b>z/xy</b>	<b>00</b>	<b>01</b>	<b>11</b>	<b>10</b>
<b>0</b>	0	0	1	1
<b>1</b>	1	1	0	0

Q2-3.

$x \setminus yz$	00	01	11	10
0	1	1	1	1
1	1	1	1	1

$$A = Y + XZ$$

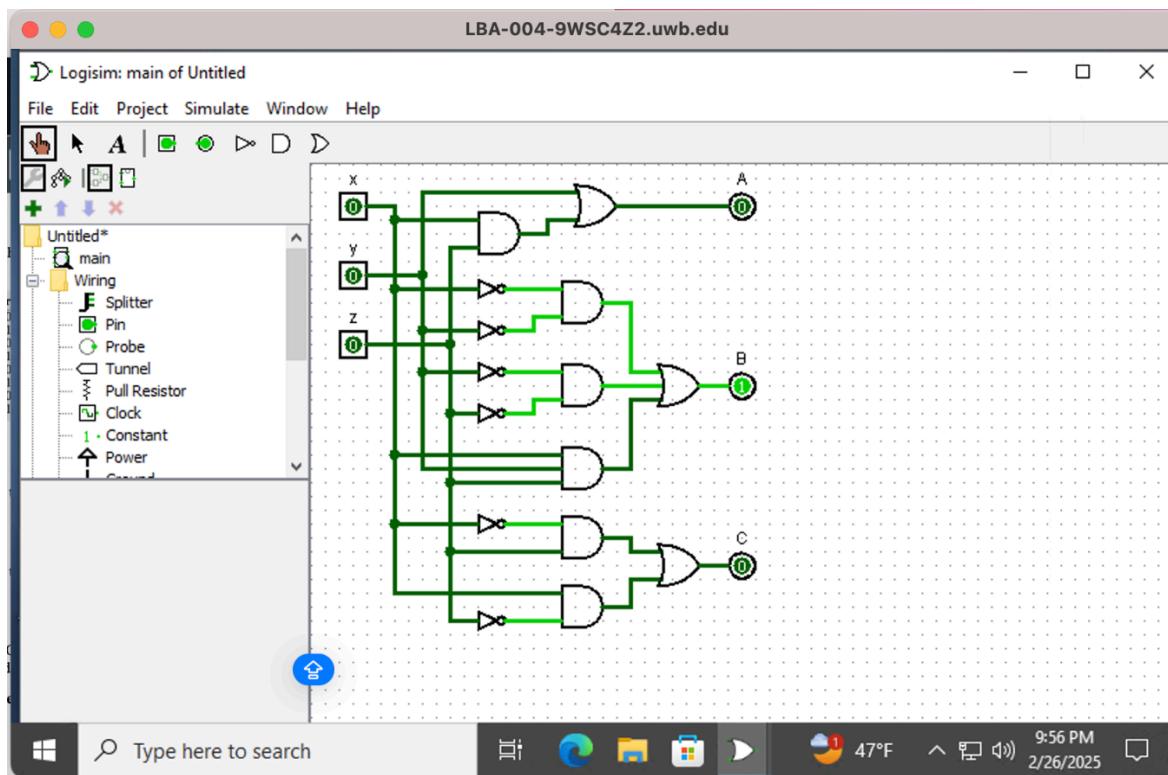
$x \setminus yz$	00	01	11	10
0	1	1	1	1
1	1	1	1	1

$$B = \neg x \cdot \neg y \cdot z + \neg y \cdot \neg z \cdot x + x \cdot y \cdot z$$

$x \setminus yz$	00	01	11	10
0	1	1	1	1
1	1	1	1	1

$$C = \neg x \cdot z + x \cdot \neg z$$

Q2-4.



Q2-5.

The screenshot shows a Logisim statistics window titled "Logisim: main Statistics". The table provides a breakdown of components used in the project:

Component	Library	Simple	Unique	Recursive
Pin	Wiring	6	6	6
NOT Gate	Gates	6	6	6
AND Gate	Gates	6	6	6
OR Gate	Gates	3	3	3
TOTAL (without project's subcircuits)		21	21	21
TOTAL (with subcircuits)		21	21	21

Q3-1.

<b>A</b>	<b>B</b>	<b>= C</b>	<b>A1</b>	<b>A0</b>	<b>B1</b>	<b>B0</b>	<b>C3</b>	<b>C2</b>	<b>C1</b>	<b>C0</b>
0	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	1	0	0	0	0
0	2	0	0	0	1	0	0	0	0	0
0	3	0	0	0	1	1	0	0	0	0
1	0	0	0	1	0	0	0	0	0	0
1	1	1	0	1	0	1	0	0	0	1
1	2	2	0	1	1	0	0	0	1	0
1	3	3	0	1	1	1	0	0	1	1
2	0	0	1	0	0	0	0	0	0	0
2	1	2	1	0	0	1	0	0	1	0
2	2	4	1	0	1	0	0	1	0	0
2	3	6	1	0	1	1	0	1	1	0
3	0	0	1	1	0	0	0	0	0	0
3	1	3	1	1	0	1	0	0	1	1
3	2	6	1	1	1	0	0	1	1	0
3	3	9	1	1	1	1	1	0	0	1

Q3-2.

$$C_0 = A_0 B_0 + A_1 A_0 B_1 B_0 + A_1 A_0 B_1 B_0 = A_0 B_0$$

$$C_3 = A_1 A_0 B_1 B_0$$

Q3-3.

<b>A1A0 / B1B0</b>	<b>00</b>	<b>01</b>	<b>11</b>	<b>10</b>
<b>00</b>	0	0	0	0
<b>01</b>	0	0	0	0
<b>11</b>	0	0	0	1
<b>10</b>	0	0	1	1

$$C2 = A1B0(A0+B0)'$$

Q3-4.

<b>A1A0 / B1B0</b>	<b>00</b>	<b>01</b>	<b>11</b>	<b>10</b>
<b>00</b>	0	0	0	0
<b>01</b>	0	0	1	1
<b>11</b>	0	1	0	1
<b>10</b>	0	1	1	0

$$C1 = A1B0(A0B1)' + A0B1(A1B0)'$$

Q3-5.

Q3-6.