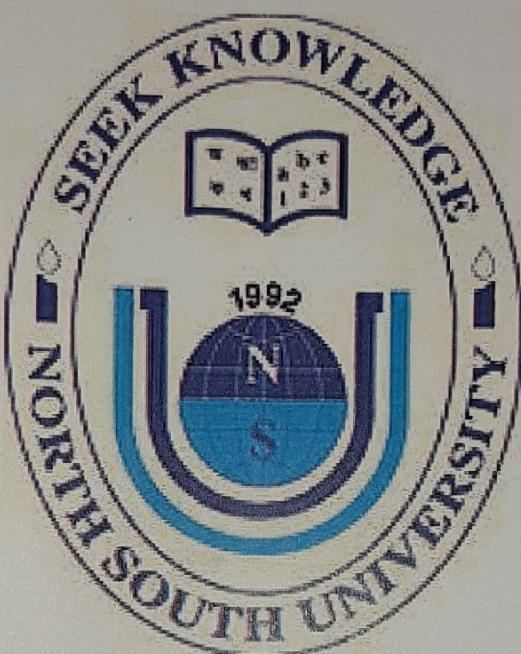


SEMESTER : FALL 2019

DATE: 26th November, 2019
COURSE: CSE231
SECTION: 11



PROJECT REPORT

Group-02

Name of the members:

- | | |
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Name of the course instructor: Tanjila Farah

Project Name: Using 7-segment LED Light Printing ae-2Fh3

Digital logic Design project

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Specifications:

We chose Simplified POS(Product of sum) for making our seven segment LED project. Simplified POS helped us to build it by minimizing our cost. The IC-gates used in making this project is very user friendly and was implemented easily.

Costing:

1. Bread Board : 2 pieces	$2*90\text{tk}=180\text{tk}$
2. 2 Input OR : 2 pieces	$2*30\text{tk}=60\text{tk}$
3. 2 Input AND: 1 piece	$1*30\text{tk}=30\text{tk}$
4. 3 Input OR : 1 piece	$1*30\text{tk}=30\text{tk}$
5. 3 Input AND: 1piece	$1*30\text{tk}=30\text{tk}$
6. NOT gate: 1piece	$1*30\text{tk}=30\text{tk}$
7. Wires :	=40tk
8. Resistors (1k ohm &220 ohm):	= 10tk
9. Led lights:	=10tk
10.7-segment LED light:	$1*30\text{tk}=30\text{tk}$
11.9-volt Battery:	$1*40\text{tk}=40\text{tk}$
12.Battery terminal:	$1*10\text{tk}=10\text{tk}$
TOTAL COST:	=500TK

* Truth table :

x	y	z	a	b	c	d	e	f	g
0	0	0	*	X	X	X	X	X	X
0	0	1	1	1	1	1	1	0	1
0	1	0	1	1	0	1	1	1	1
0	1	1	0	0	0	0	0	0	1
1	0	0	1	1	0	1	1	0	1
1	0	1	1	0	0	0	1	1	1
1	1	0	0	0	1	0	1	1	1
1	1	1	1	1	1	1	0	0	1

* Generalised SOPs:

$$a = x'y'z + x'yz + xy'z + xyz + z'Rx + zRx + z'Rx' + zRx' =$$

$$b = x'y'z + x'yz + xy'z + xyz + z'Rx + zRx' + z'Rx' + zRx =$$

$$c = x'y'z + xy'z + z'Rx + zRx' =$$

$$d = x'y'z + x'yz + xy'z + xyz + z'Rx + zRx' + z'Rx + zRx' =$$

$$e = x'y'z + x'yz + xy'z + xyz + z'Rx + zRx' + z'Rx + zRx' =$$

$$f = x'y'z + xy'z + xyz' + z'Rx + zRx' + z'Rx + zRx' =$$

$$g = x'y'z + x'yz + xy'z + xyz + z'Rx + zRx' + z'Rx + zRx' =$$

* K-map :

P-2

(a)

	x'	x	y'	y	z'	z	$x'z'$
	X		1	1	1	1	
	x	1	1	1	1	1	
			1	1	1	1	
				1	1	1	
					1	1	
						1	
							1

$$= xz + x'z' + y'z$$

(b)

	x'	x	y'	y	z'	z	$x'z'$
	X		1	1	1	1	
	x	1	1	1	1	1	
		1	1	1	1	1	
			1	1	1	1	
				1	1	1	
					1	1	
						1	
							1

$$= xy + x'y' + yz + y'z + xz + x'z' =$$

(c)

	x'	x	y'	y	z'	z	$x'z'$
	X		1	1	1	1	
	x	1	1	1	1	1	
		1	1	1	1	1	
			1	1	1	1	
				1	1	1	
					1	1	
						1	
							1

$$= xy + x'y + yz + y'z + xz + x'z' =$$

(d)

	x'	x	y'	y	z'	z	$x'z'$
	X		1	1	1	1	
	x	1	1	1	1	1	
		1	1	1	1	1	
			1	1	1	1	
				1	1	1	
					1	1	
						1	
							1

$$= xy + x'y + yz + y'z + xz + x'z' =$$

②

X	X	0	1,1	3	1,2		
X	1	1	1,5	7	1,6		

$\rightarrow z'$

$\downarrow R$

$= y' + z'$

③

X	X	0	1,1	3	1,2		
X	1	1	1,5	7	1,6		

$\downarrow x'$

$\downarrow z'$

$= xy'z + yz'$

④

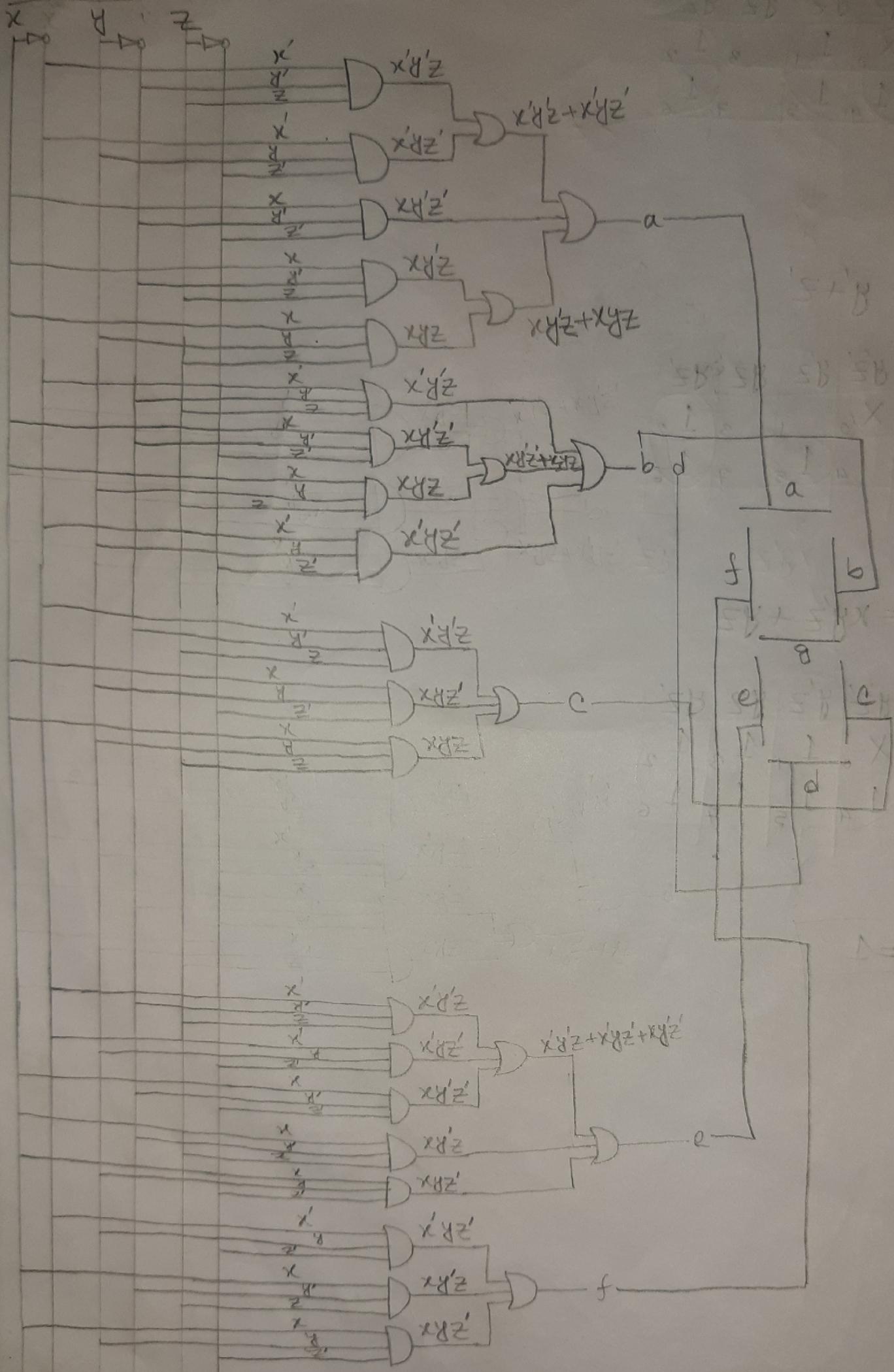
X	X	0	1,1	1,3	1,2		
X	1	1	1,5	1,7	1,6		

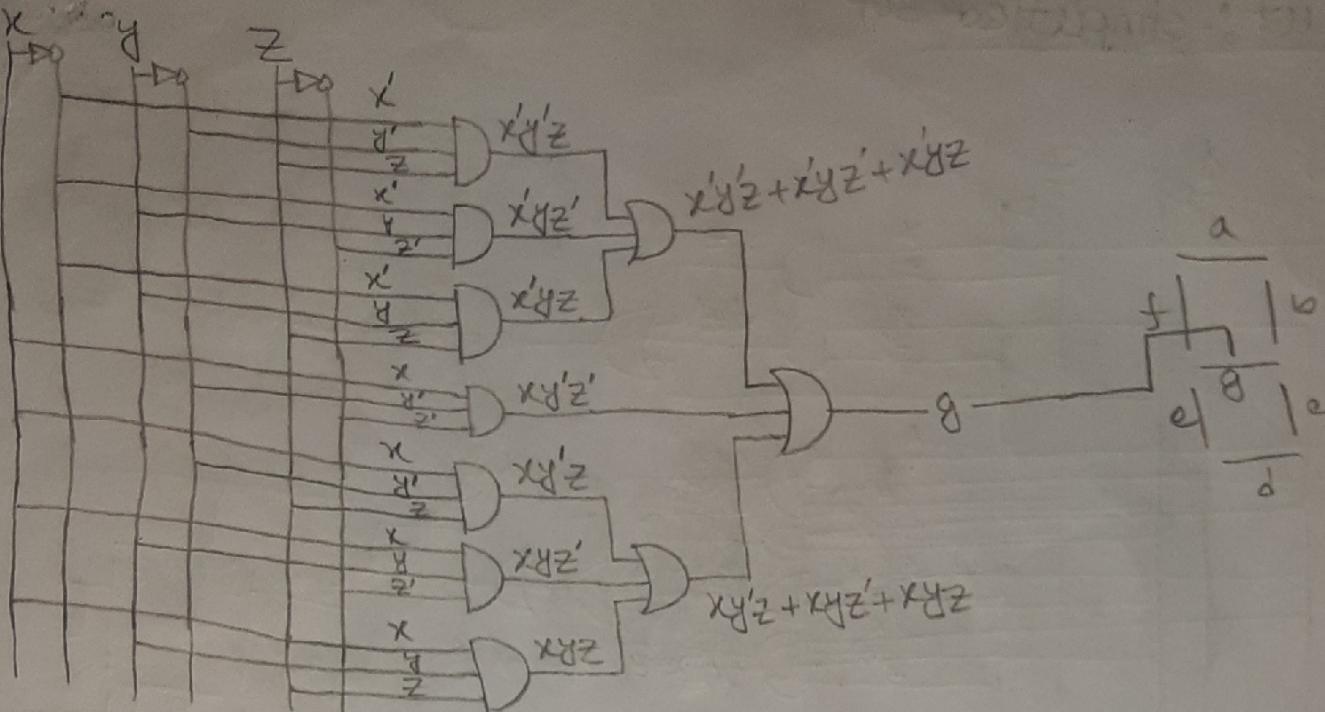
$\downarrow 1$

$(=1)$

*Circuit: Generalised SOP

P-4



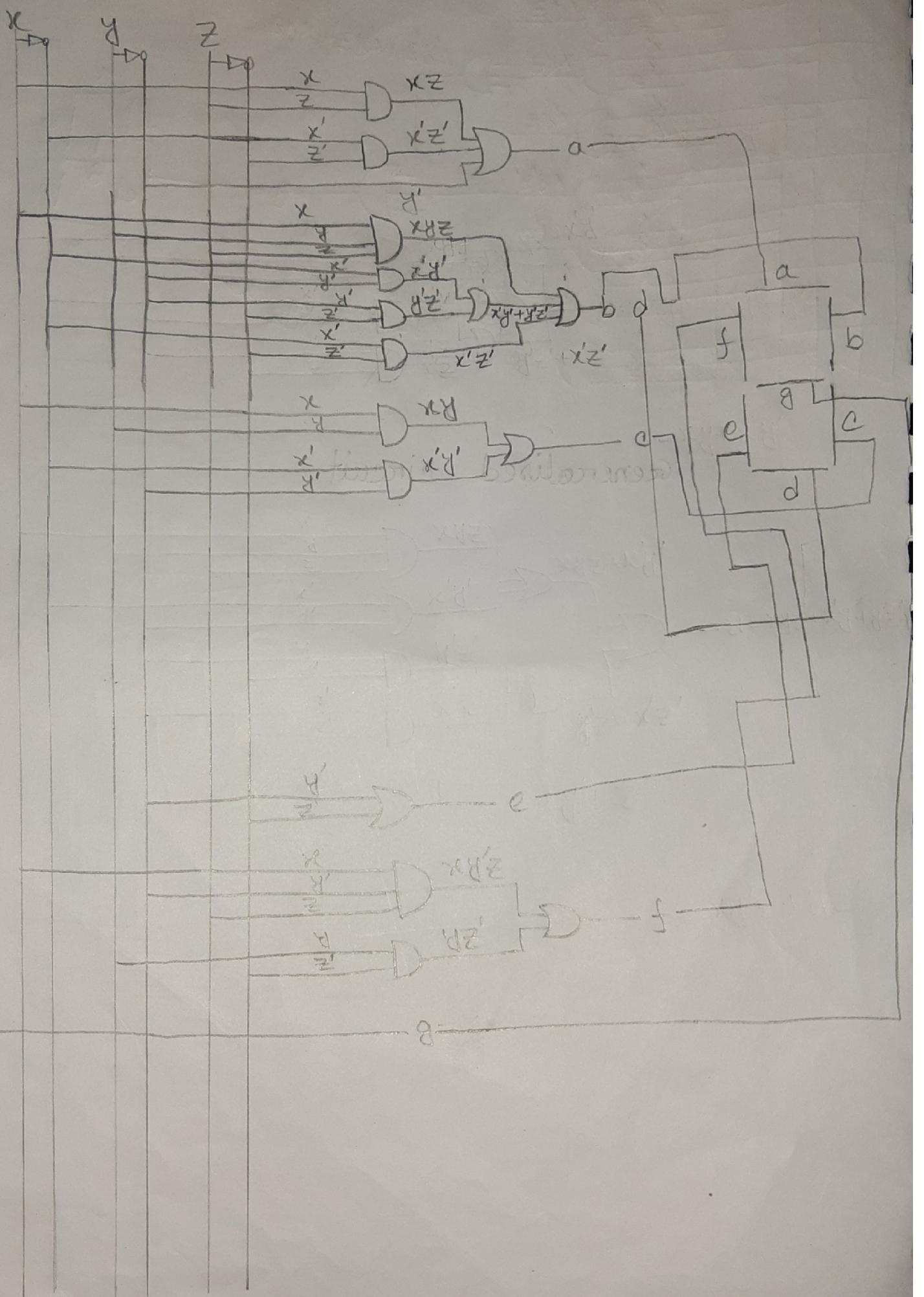


Generalised circuit

* circuit:- simplified sop

P-6

1



Generalised pos:

$$a = (x+y+z')(x'+y+z)$$

$$b = (x+y+z')(x'+y+z')(x'+y'+z)$$

$$c = (x+y+z)(x+y'+z')(x'+y+z)(x'+y'+z')$$

$$d = (x+y+z')(x'+y+z')(x'+y'+z) \quad (B+x)(B+x') =$$

$$e = (x+y+z')(x'+y'+z')$$

$$f = (x+y+z')(x+y+z')(x'+y+z)(x'+y'+z') \quad SB \quad b$$

$$g = 0$$

\leftarrow K-map

a

	$y'z'$	$y'z$	yz	yz'
x'	1	0	1	1
x	1	1	1	0
	4	5	6	7

$$x'y'z = (x+y+z')$$

$$xy'z' = (x'+y'+z)$$

$$= (x+y+z')(x'+y'+z)$$

b

	$y'z'$	$y'z$	yz	yz'
x'	1	0	1	1
x	1	0	1	0
	4	5	6	7

$$x'y'z = (x+y+z')$$

$$xy'z' = (x'+y'+z)$$

$$= (x+y+z')(x'+y+z')(x'+y'+z)$$

	x'	x	y'	y	z'	z	R	R'	xR	$x'R$	yR	$y'R$	zR	$z'R$
x'	X	1	0	1	0	1	0	1	0	1	0	1	0	1
x	0	0	1	1	1	1	0	0	1	1	1	1	0	0

$$R+x = R'x$$

$$(S+B+x)(S+B+x) = 0$$

$$(S+B+x)(S+B+x)(S+B+x) = 0$$

$$(S+B+x)(S+B+x)(S+B+x)(S+B+x) = 0$$

$$= (x+R)(x'+R)$$

$$(S+B+x)(S+B+x)(S+B+x) = 0$$

$$(S+B+x)(S+B+x)(S+B+x)(S+B+x) = 0$$

	x'	x	y'	y	z'	z	R	R'	xR	$x'R$	yR	$y'R$	zR	$z'R$
x'	X	1	0	1	0	1	0	1	0	1	0	1	0	1
x	1	0	1	1	0	1	0	1	0	1	0	1	0	1

$$xy'z = (x+y+z')$$

$$xyz = (x'+y'+z)$$

$$= (x+y+z')(x'+y+z)(x'+y'+z)$$

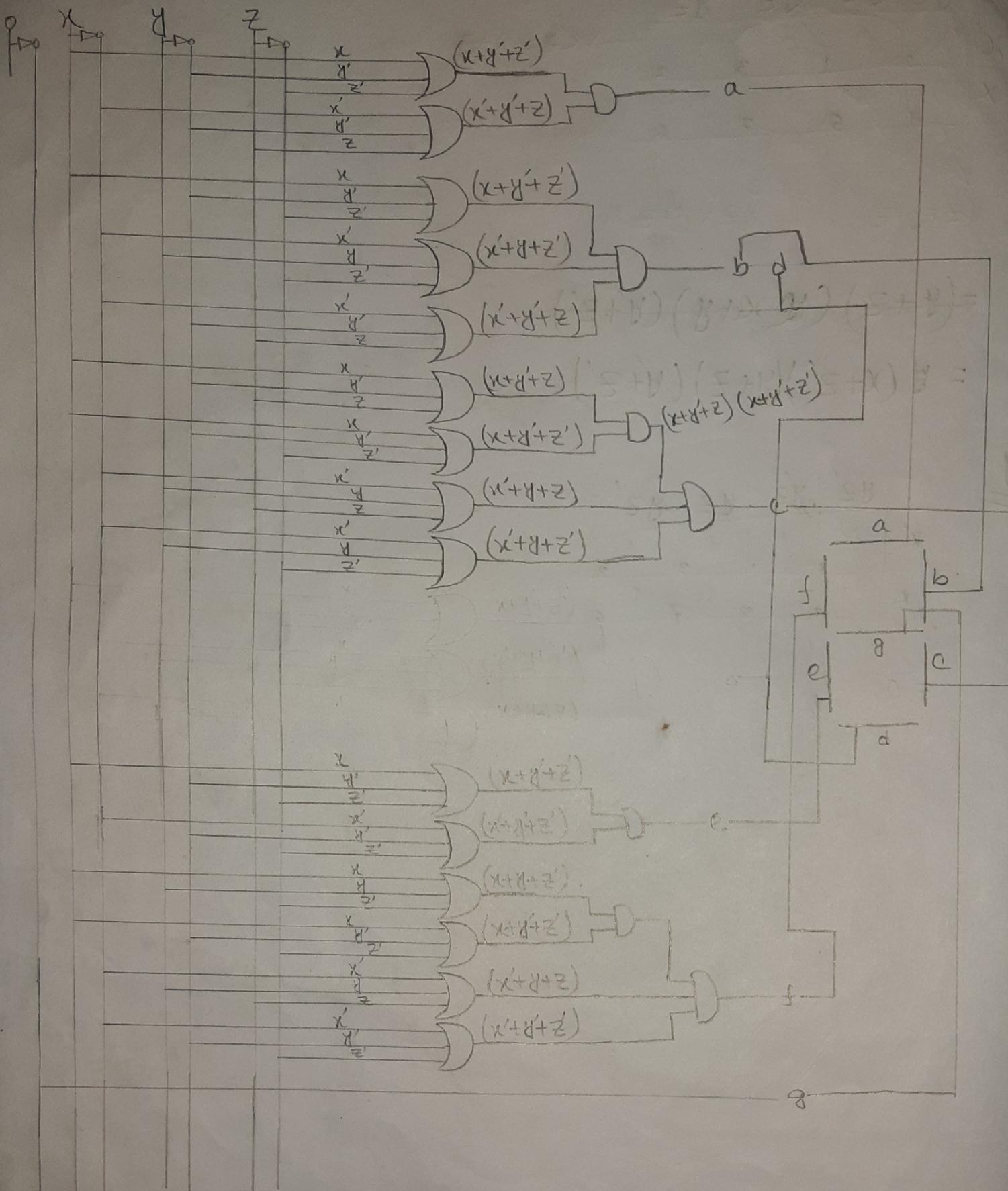
	x'	x	y'	y	z'	z	R	R'	xR	$x'R$	yR	$y'R$	zR	$z'R$
x'	X	1	0	1	0	1	0	1	0	1	0	1	0	1
x	1	0	1	1	0	1	0	1	0	1	0	1	0	1

$$yz = y'+z'$$

$$= (y+z')$$

* circuit - Generalised - POS

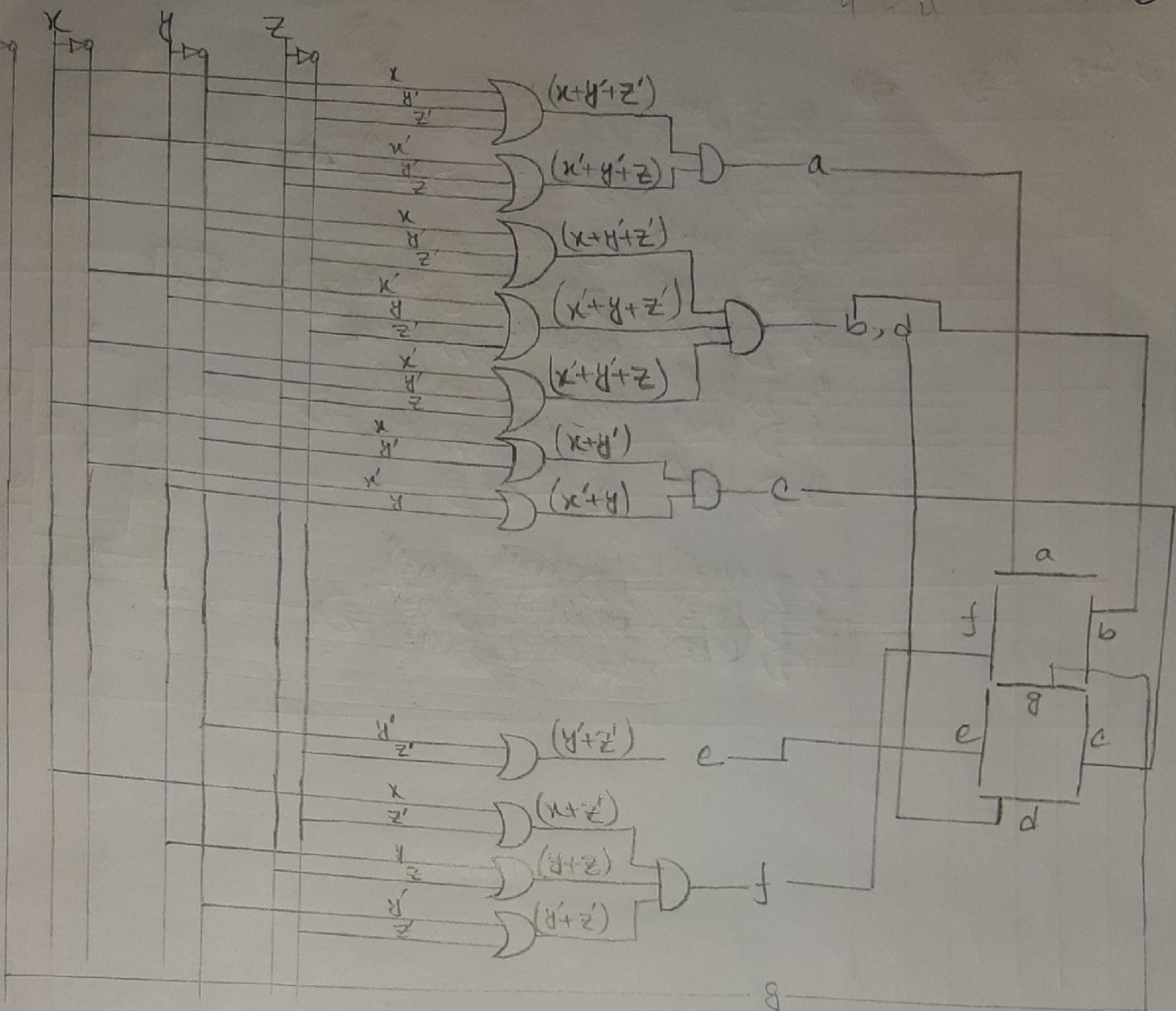
P-10



Generalised Circuit

circuit - simplified - pos

P-13
P-13

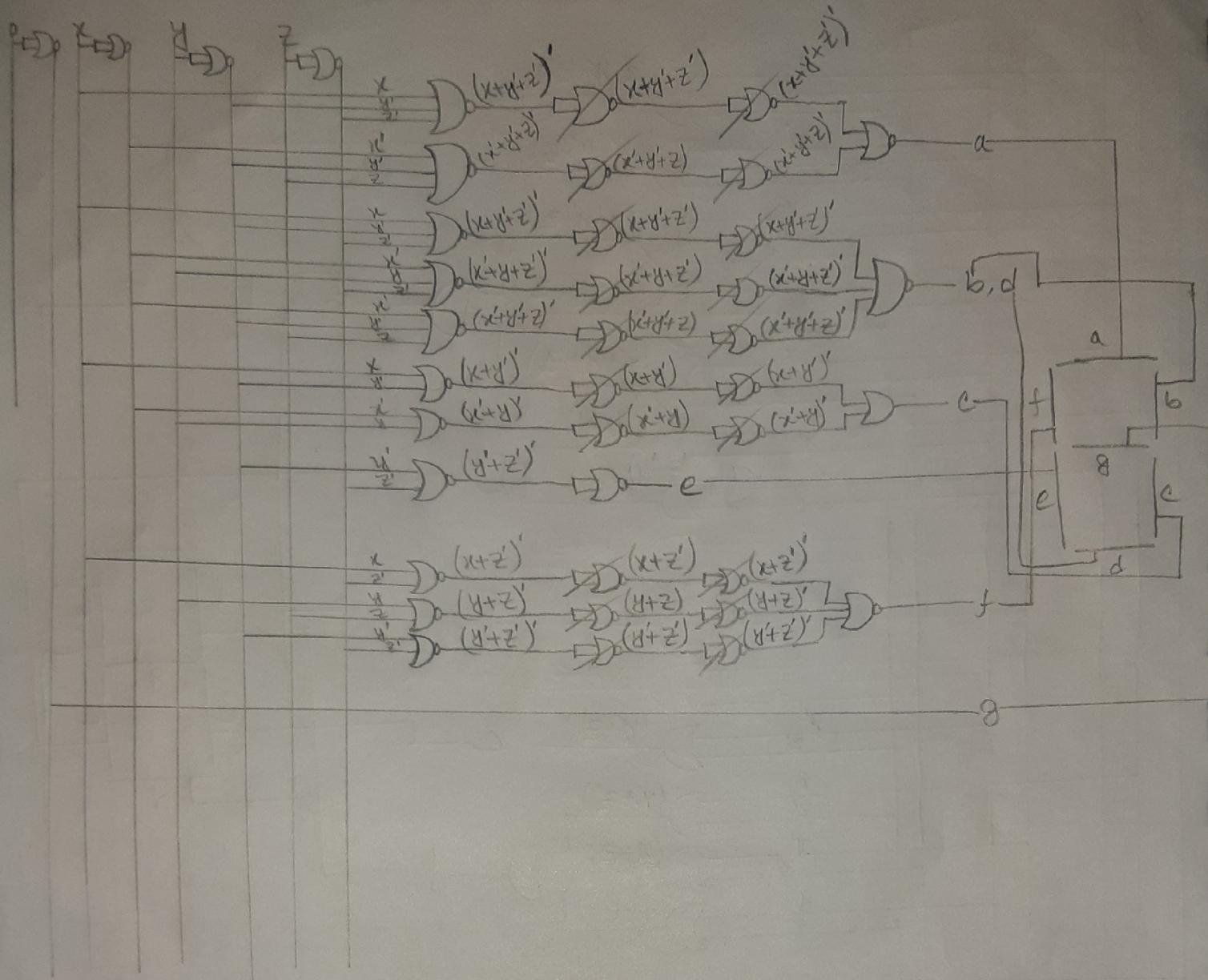


Simplified Circuit

*Circuit using NOR:

Q1 by IITG

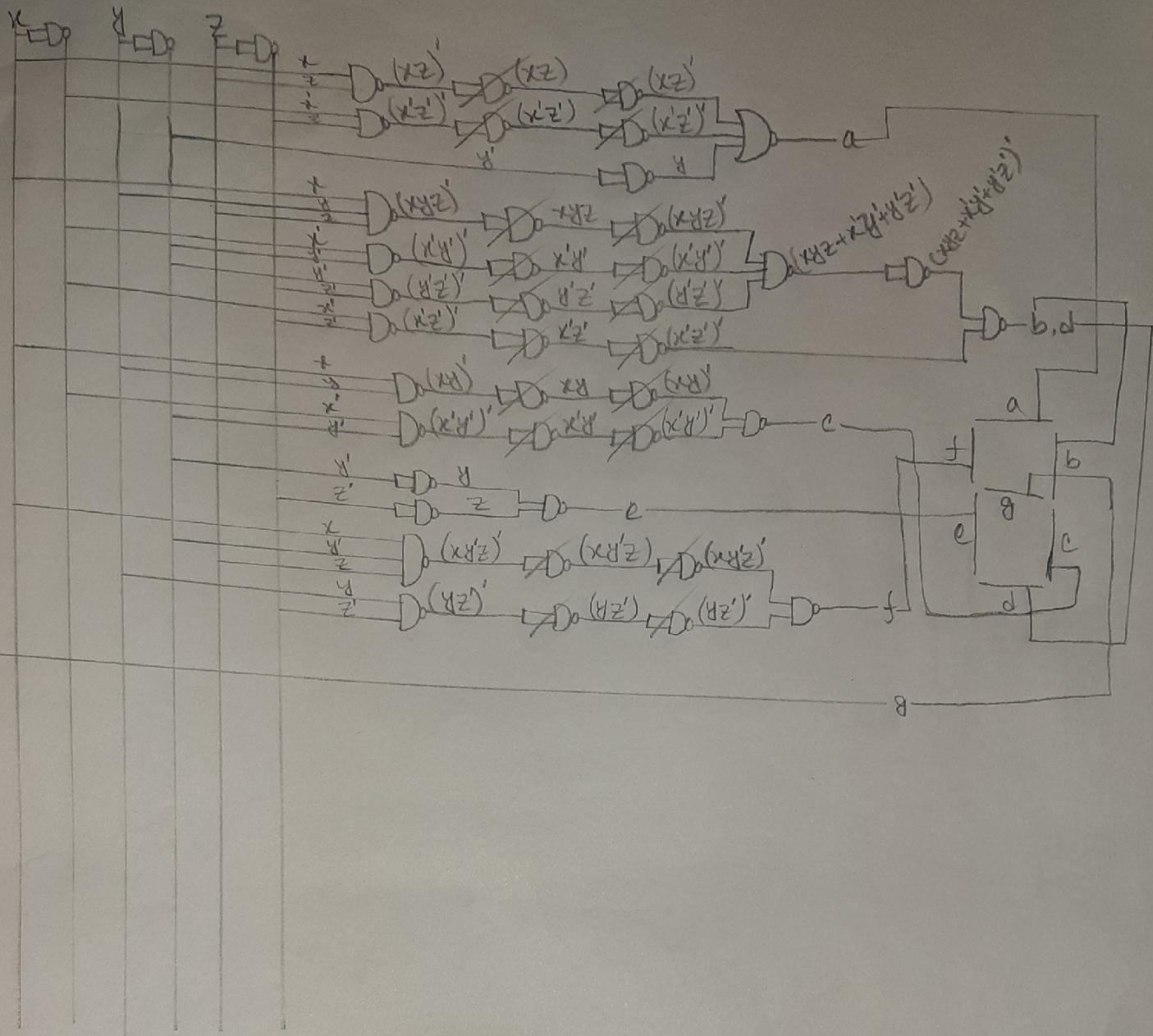
P-12



Circuit using NOR

Circuit using NAND

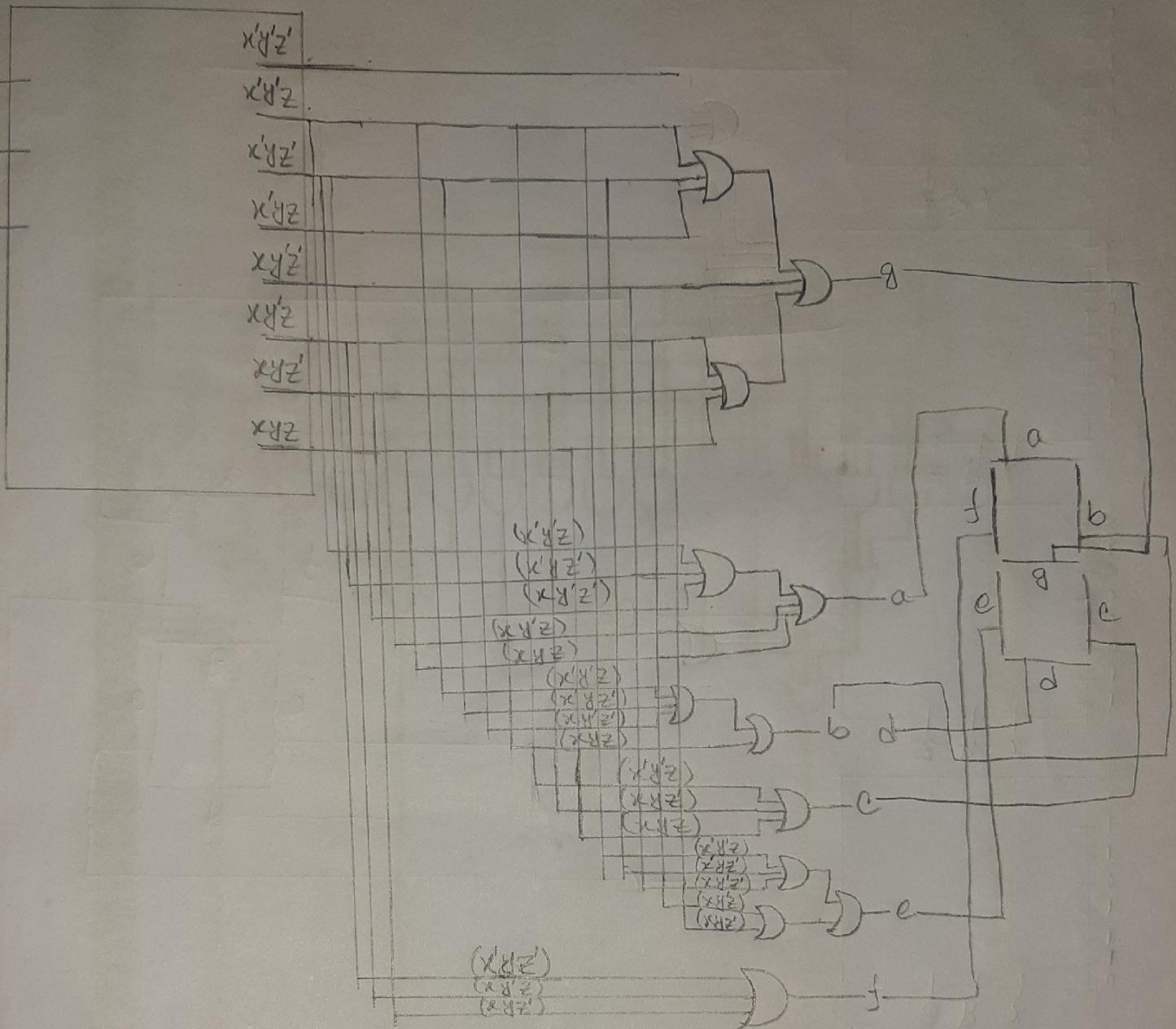
P-15



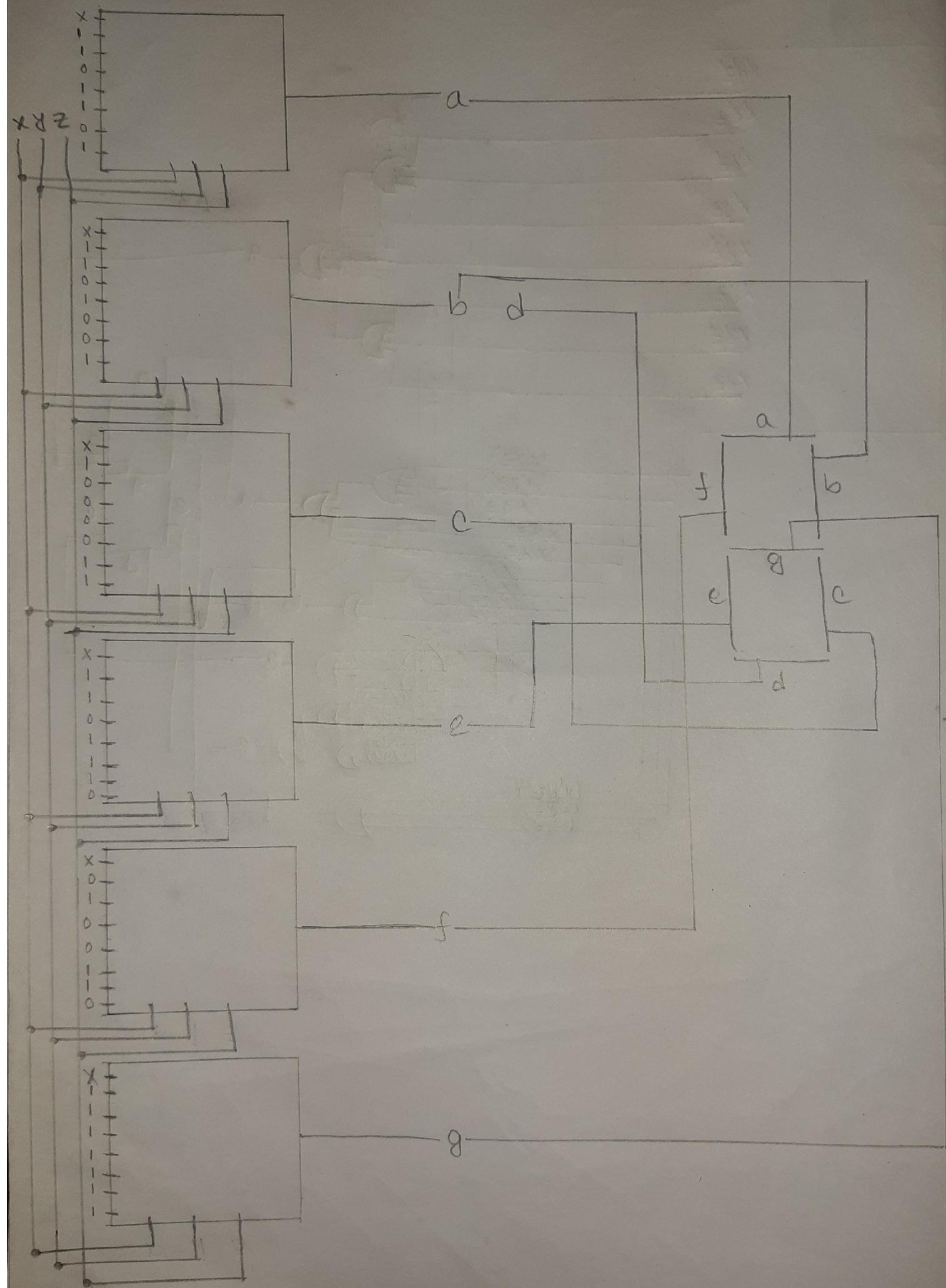
Circuit using NAND

Circuit - Decoder

P-1517

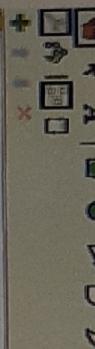


*Circuit - Multiplexer



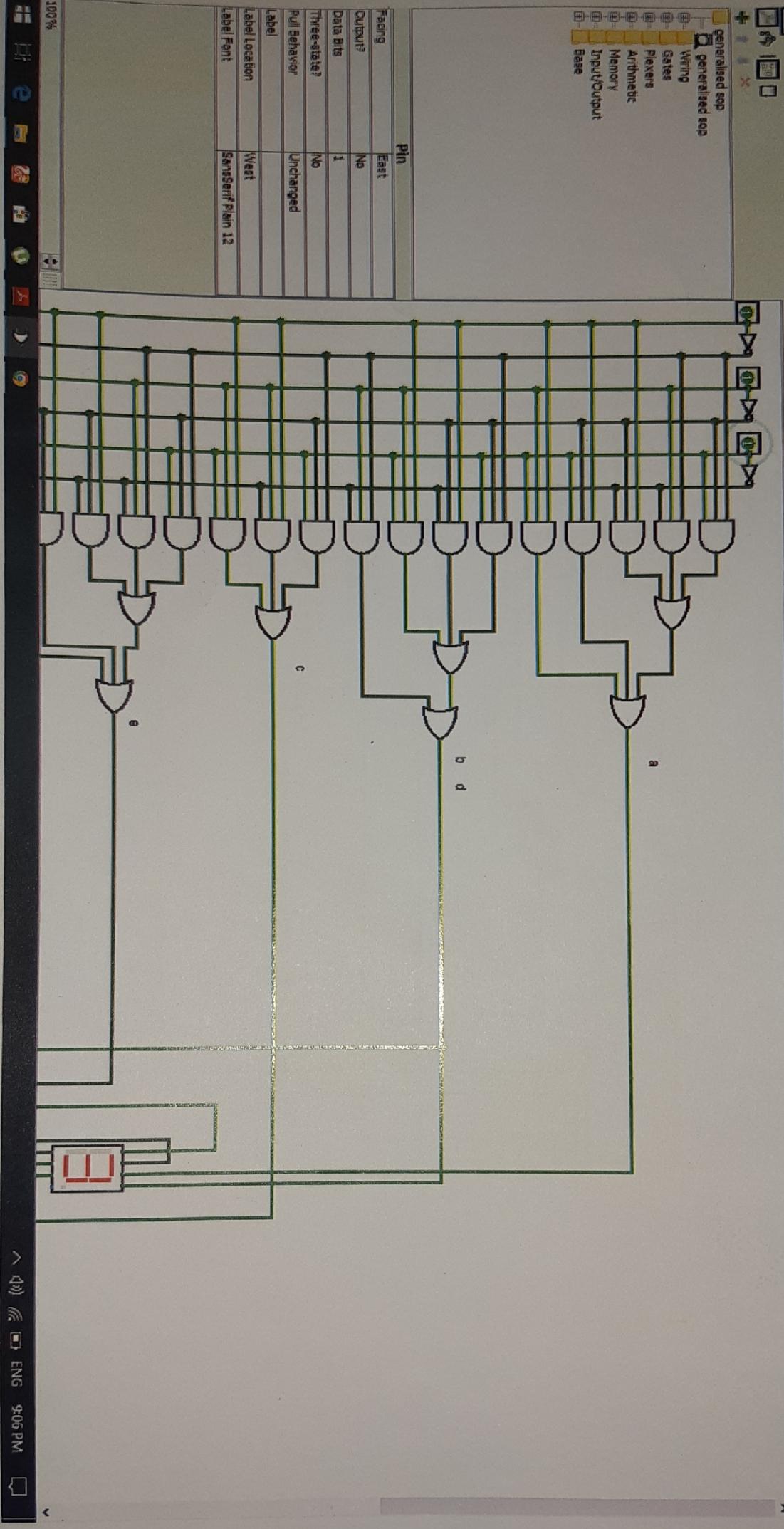
Logisim: generalised sop of generalised sop

File Edit Project Simulate Window Help



+	generalised sop
-	generalised sop
Wing	
Gates	
plexers	
Arithmetic	
Memory	
InputOutput	
Base	

generalised sop

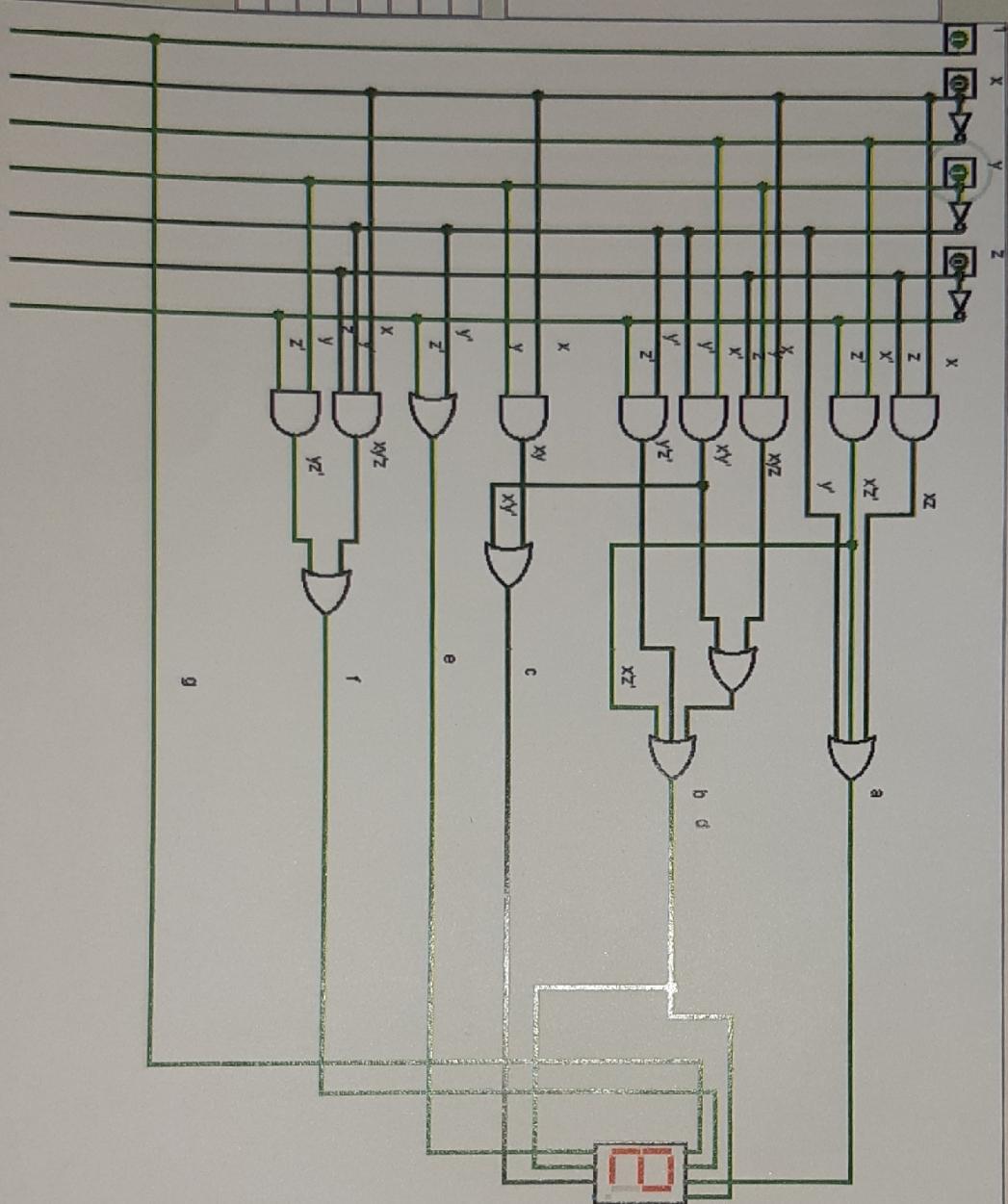


Logisim simplified sop sort of simplified sop sort

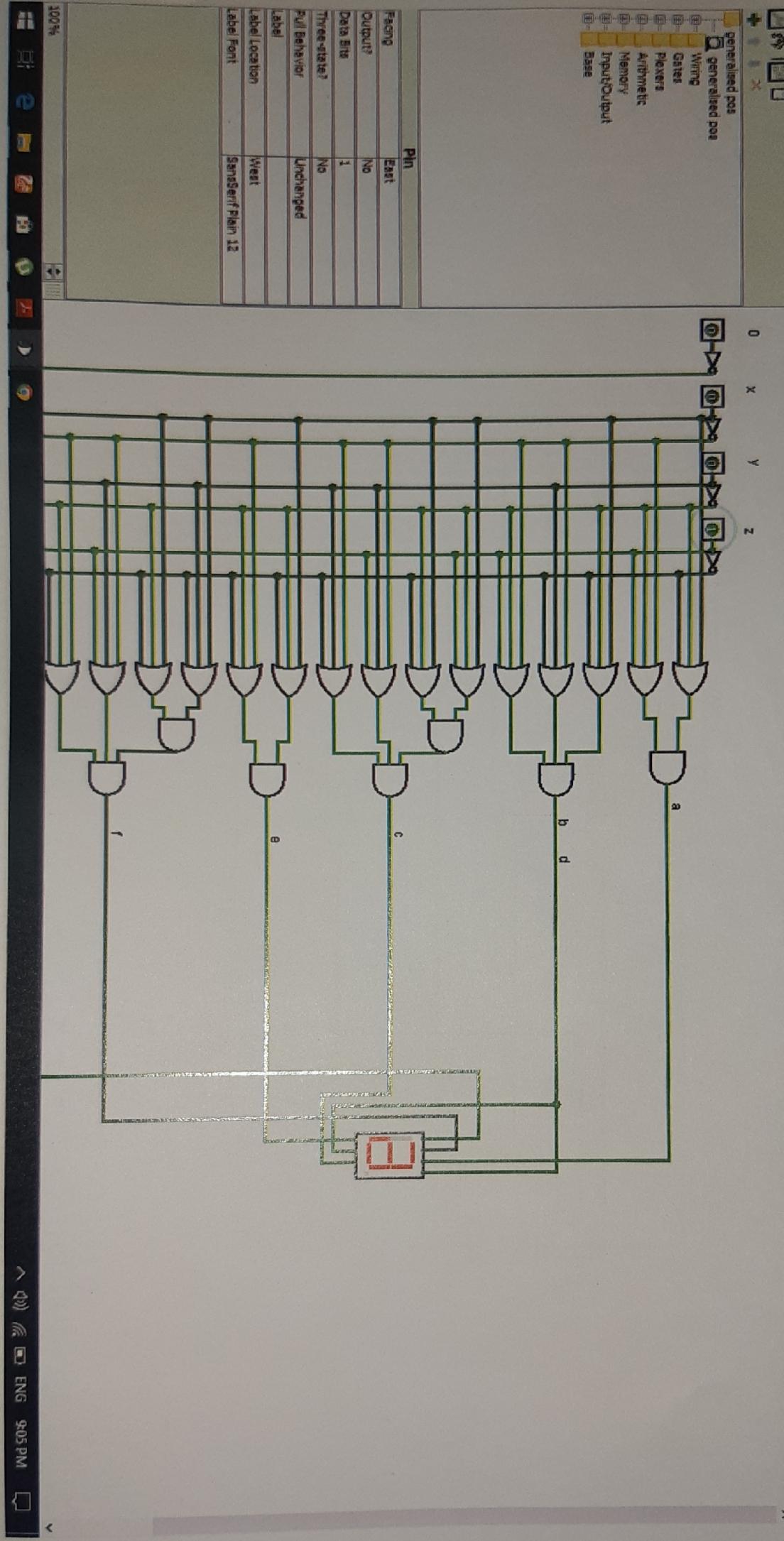
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Simplified SOP

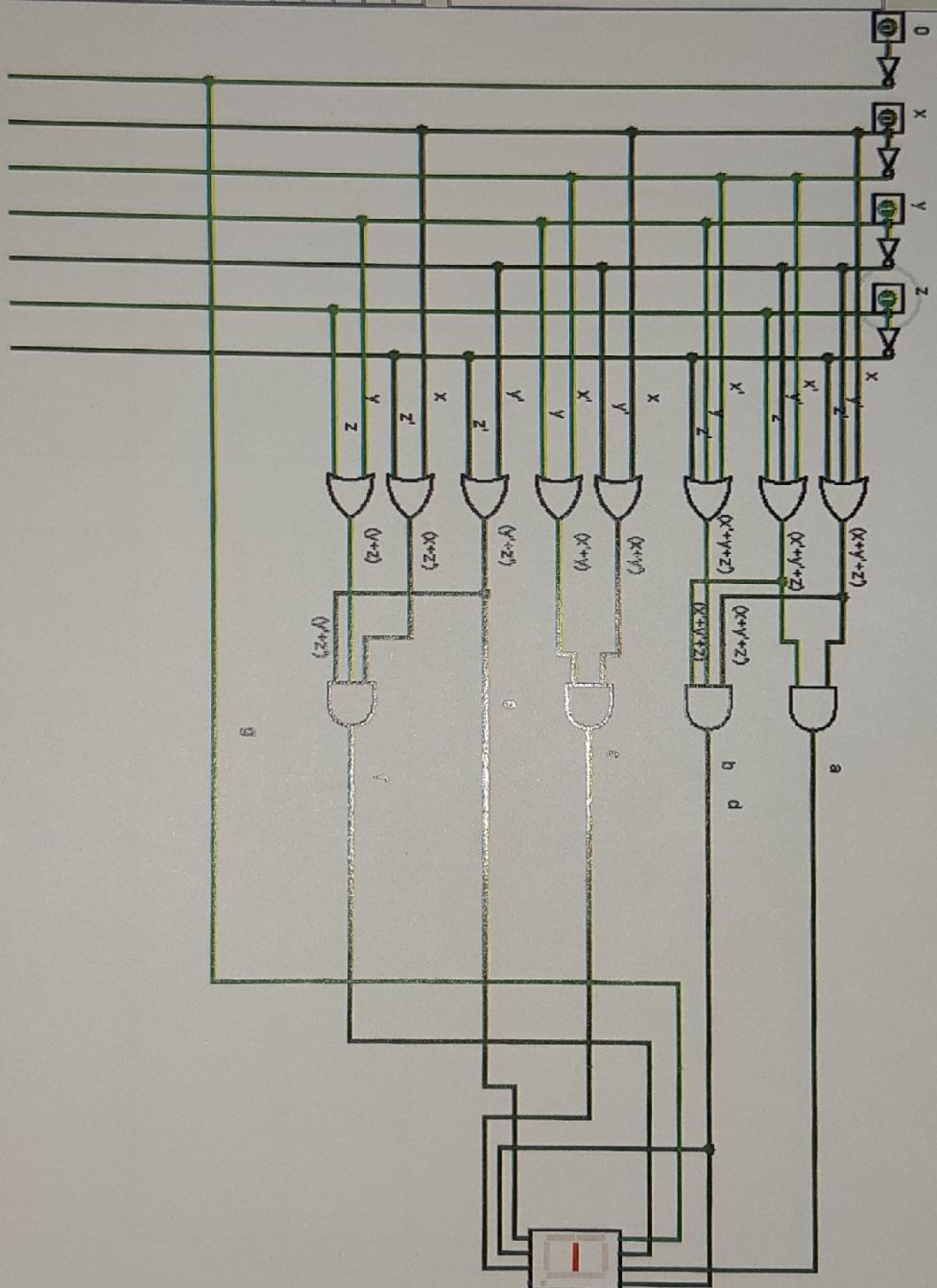
- simplified sop sort
- simplified sop sort'
- Wiring
- Gates
- Mixers
- Arithmetic
- Memory
- Input/Output
- Base



Generalised POS

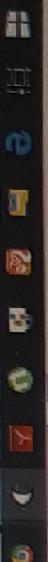


Simplified POS



simplified pos sort
simplified pos sort
Wiring
Gates
Registers
Arithmetic
Memory
InputOutput
Base

File Edit Project Simulate Window Help

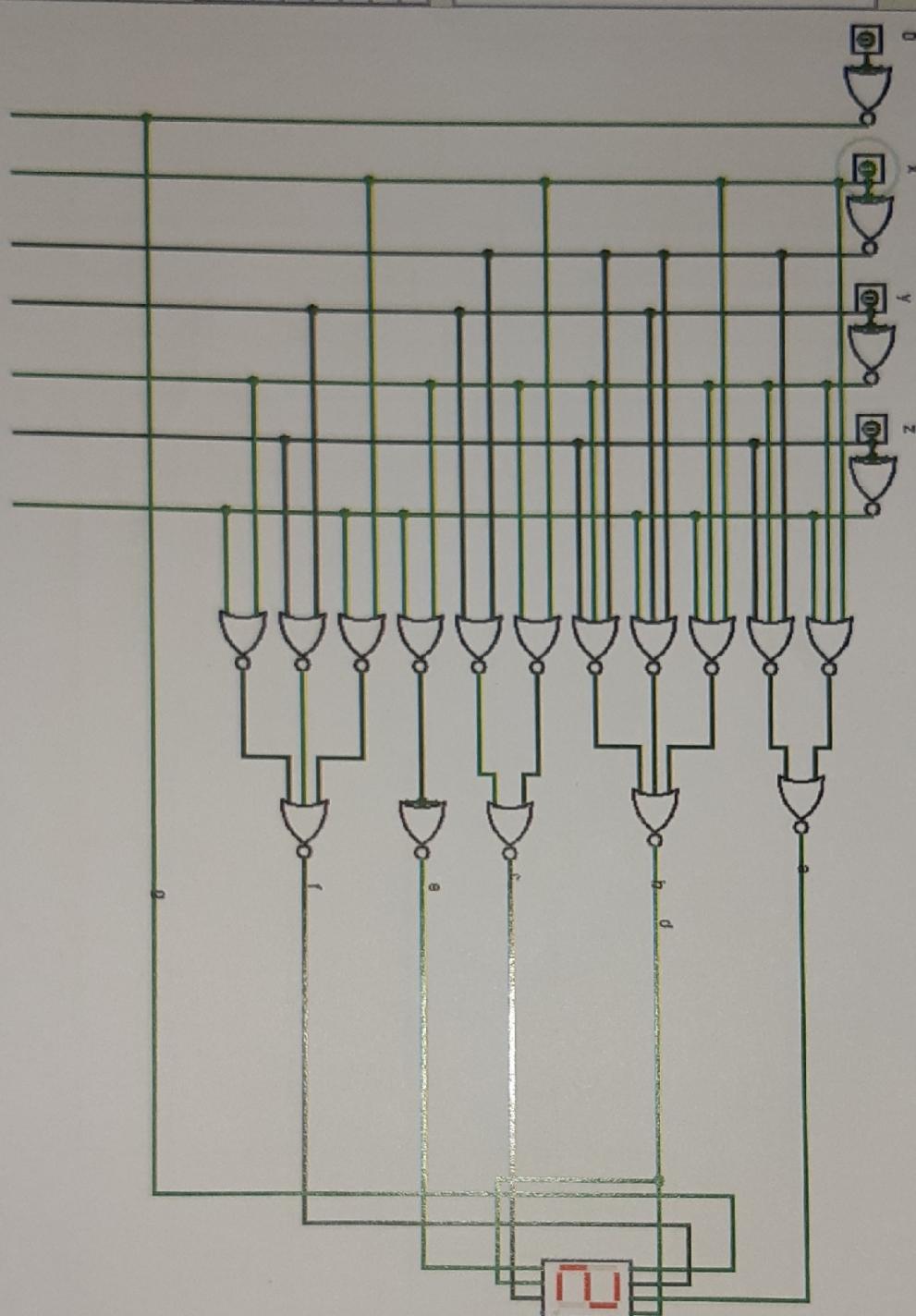


100%
ENGLISH
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Logisim: NOR of NOR
File Edit Project Simulate Window Help

NOR

NOR
NOR
Wiring
Gates
MUXes
Arithmetic
Memory
Input/Output
Base



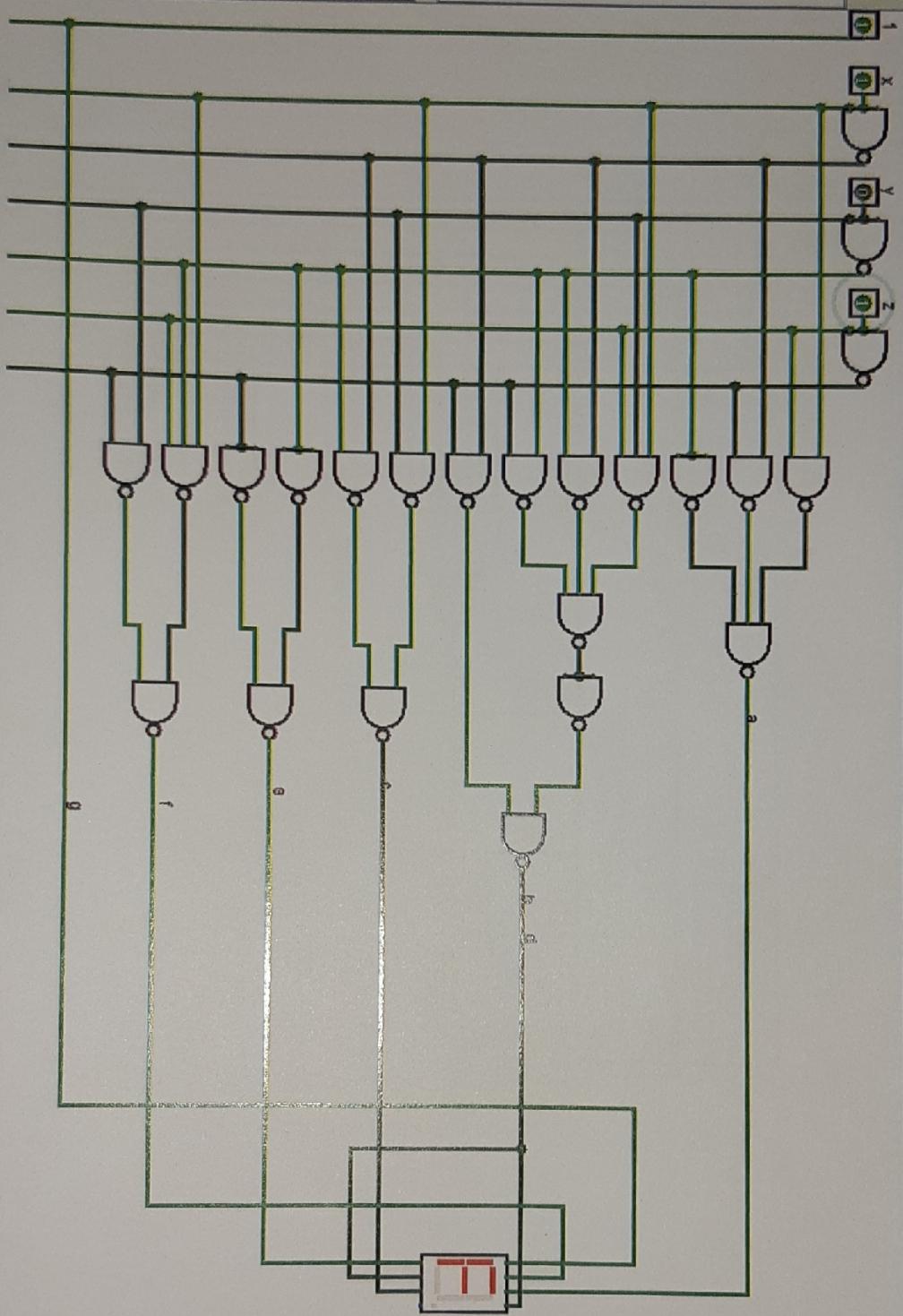
Logisim: main of NAND

File Edit Project Simulate Window Help



NAND	math
Wire	wire
Gates	gate
Players	player
Arithmetic	arithmetic
Memory	memory
Input/Output	io
Base	base

NAND



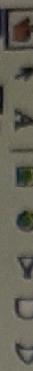
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X

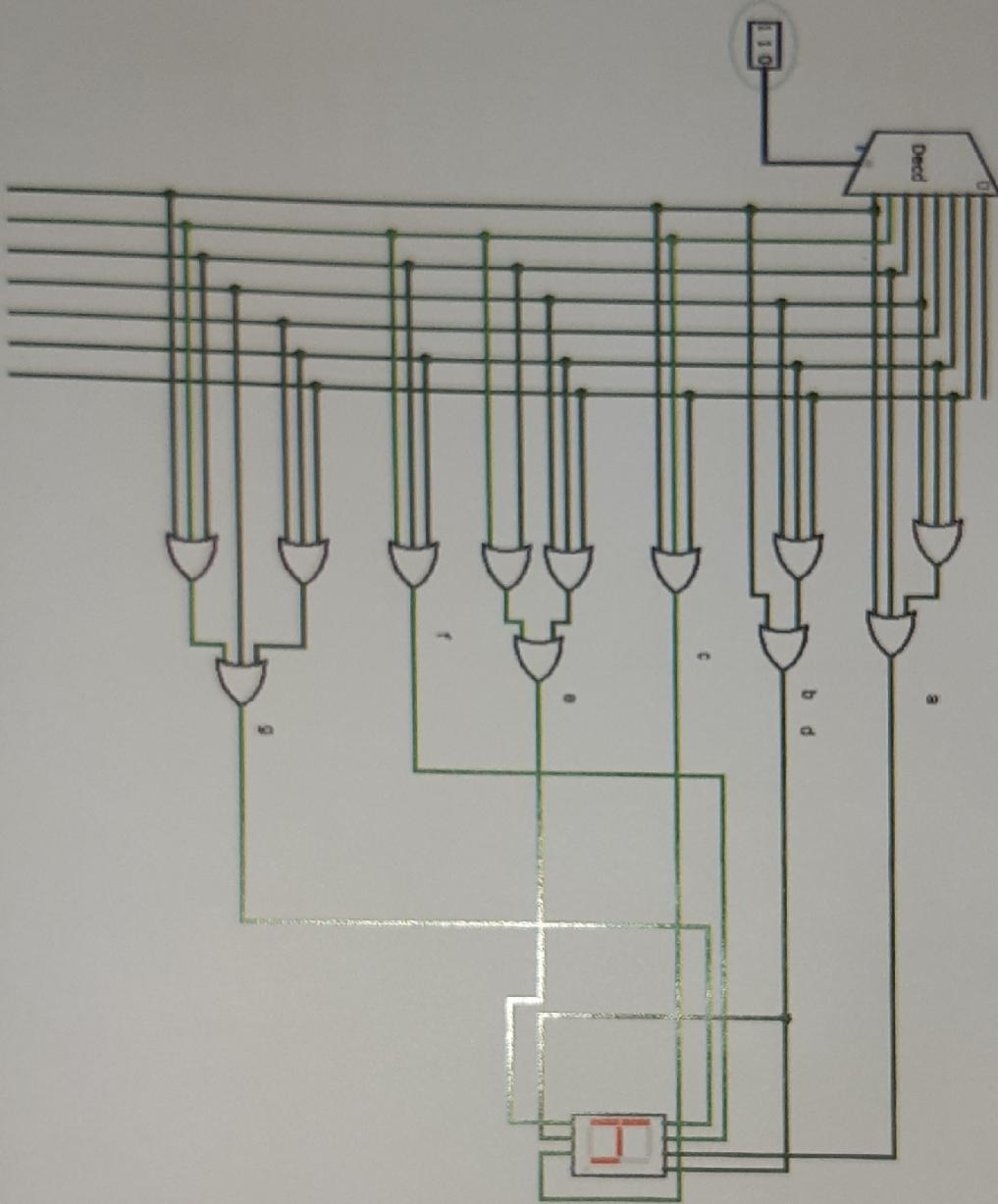
Logisim: decoder of decoder

File Edit Project Simulate Window Help



- + decoder
- decoder
- Wiring
- Gate
- Memory
- Arithmetic
- Register
- InputOutput
- Done

decoder

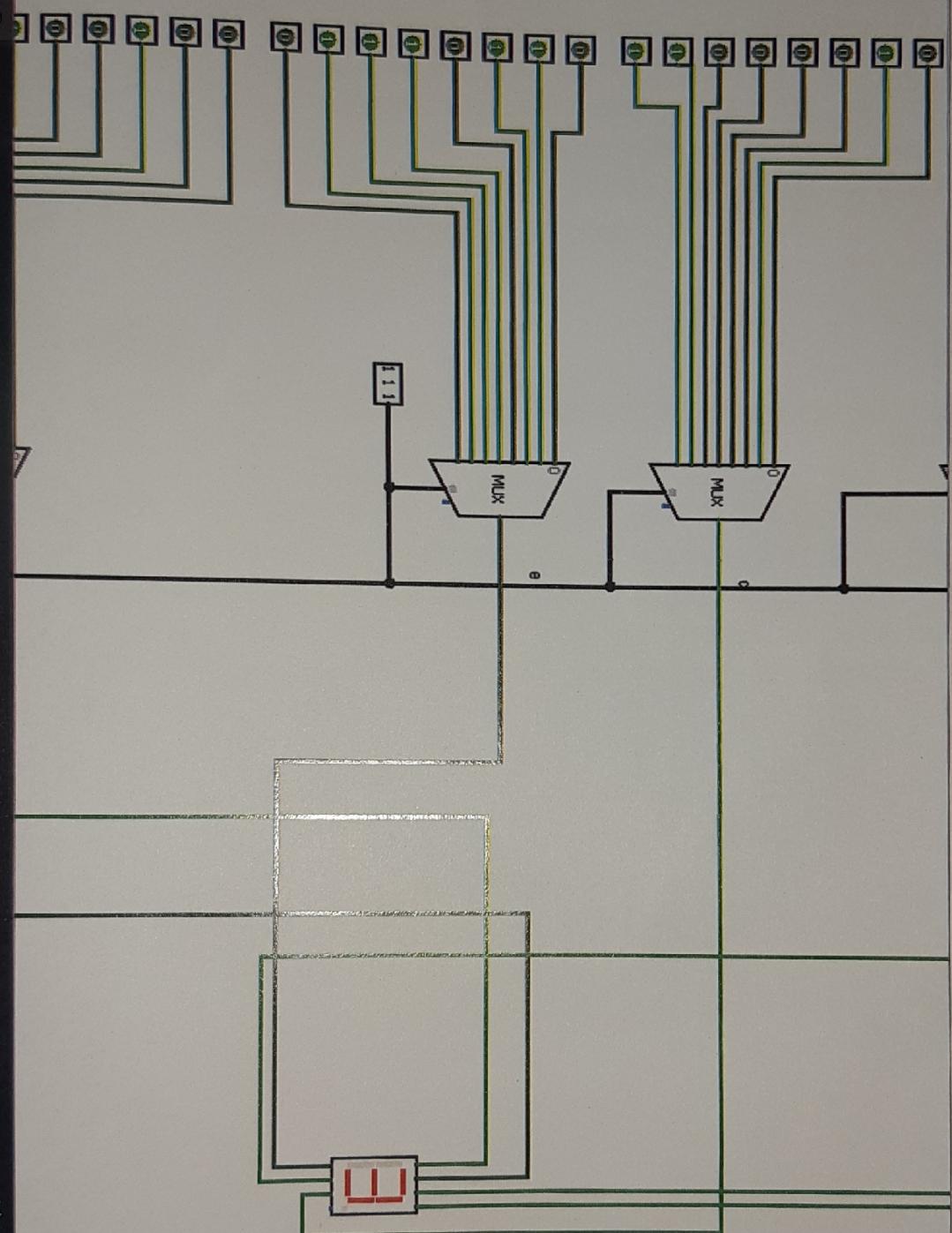


Logisim multiplexer of multiplexer
File Edit Project Simulate Window Help



- multiplexer
- multiplexer
- wiring
- gates
- pluggers
- arithmetic
- memory
- input/output
- base

multiplexer.



Procedure:

At first , we have checked all the IC-gates and segment LED is properly working or not. If any gate is not in good condition we have to face difficulties, that's why we have checked before implementation. Then , we checked all negative & positive connection in the board before giving connection to 9-volt battery.Next, we have started working by using the IC- gates by putting on the board. We carefully gave input connections by keeping the pin configuration of IC-gates in our mind. We also carefully gave connection to Vcc and Gnd in the gates.In these way, by using simplified POS we found our desire output in 7-segment LED light.

Difficulties:

The difficulties we faced during implementation of our circuit is stated below:

1. While implementing the circuit design, we faced our difficulty in our 2-input OR IC-gate. 2-input OR IC-gate was not working properly as its 1st gate in the OR IC-gate was disturbed. We found out the problem and fixed it.
2. Our last digit of the project was not showing in the LED display at the first try. We checked the wires and found there was a connection problem in the wires and we fixed it.

