North South University

Department of Electrical & Computer Engineering

Project

19Z20S0

Submitted By:

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Course: CSE231

Section: 4

Submitted To:

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CSE 231

① Truth Table

19Z2050

	Input			Output						
	X	Y	Z	a	b	c	d	e	f	g
1	0	0	0	0	1	1	0	0	0	0
9	0	0	1	1	1	1	1	0	1	1
Z	0	1	0	1	1	0	1	1	0	1
2	0	1	1	1	1	0	1	1	0	1
0	1	0	0	1	1	1	1	1	1	0
S	1	0	1	1	0	1	1	0	1	1
0	1	1	0	1	1	1	1	1	1	0
x	1	1	1	x	x	x	x	x	x	x

(2) k-map

	00	01	11	10
0	0	1	1	1
1	1	1	x	1

$a = Z + Y + X$ (SOP)

$a = (X + Y + Z)$ (POS)

	00	01	11	10
0	1	1	1	1
1	1	0	x	1

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

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

	00	01	11	10
0	1	1	0	0
1	1	1	x	1

$c = Y' + X$ (SOP)

$c = (X + Y')$ (POS)

	00	01	11	10
0	0	1	1	1
1	1	1	x	1

$d = X + Y + Z$ (SOP)

$d = (X + Y + Z)$ (POS)

	00	01	11	10
0	0	0	1	1
1	1	0	x	1

$e = Y + XZ'$ (SOP)

$e = (X + Y)(Y + Z')$ (POS)

	00	01	11	10
0	0	1	0	0
1	1	1	x	1

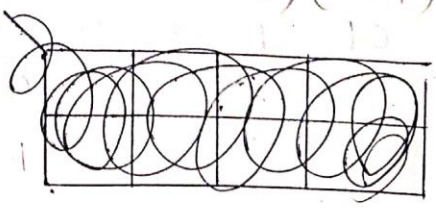
$f = X + Y'Z$ (SOP)

$f = (X + Z)(X + Y')$ (POS)

	00	01	11	10
0	0	1	1	1
1	0	1	x	0

$g = Z + X'Y$ (SOP)

$g = (Y + Z)(X' + Z)$



(3) Simplified Equation (SOP & POS)

Simplified Equation SOP	Simplified Equation POS
$a = x + Y + z$	$a = (x + Y + z)$
$b = x' + z'$	$b = (x' + z')$
$c = x + Y'$	$c = (x + Y')$
$d = x + Y + z$	$d = (x + Y + z)$
$e = Y + xz'$	$e = (x + Y)(Y + z')$
$f = x + Y'z$	$f = (x + z)(x + Y')$
$g = z + x'Y$	$g = (Y + z)(x' + z)$

④ Genenalized sop circuit with basic gates.

a = x + y + z

a = Σ(1, 2, 3, 4, 5, 6)

= xyz' + xy'z + xy'z' + x'yz + x'yz' + x'y'z

b = x' + z'

b = Σ(0, 1, 2, 3, 4, 6)

= x'yz + x'yz' + x'y'z + x'y'z' + xyz' + xy'z'

c = y' + x

c = Σ(0, 1, 4, 5, 6)

= xy'z + xy'z' + x'y'z + x'y'z' + xyz'

d = x + y + z

$d = \Sigma(1,2,3,4,5,6)$

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

e = y + xz'

$e = \Sigma(2,3,4,6)$

$= xyz' + x'yz + x'yz' + xy'z'$

f = x + y'z

$f = \Sigma(1,4,5,6)$

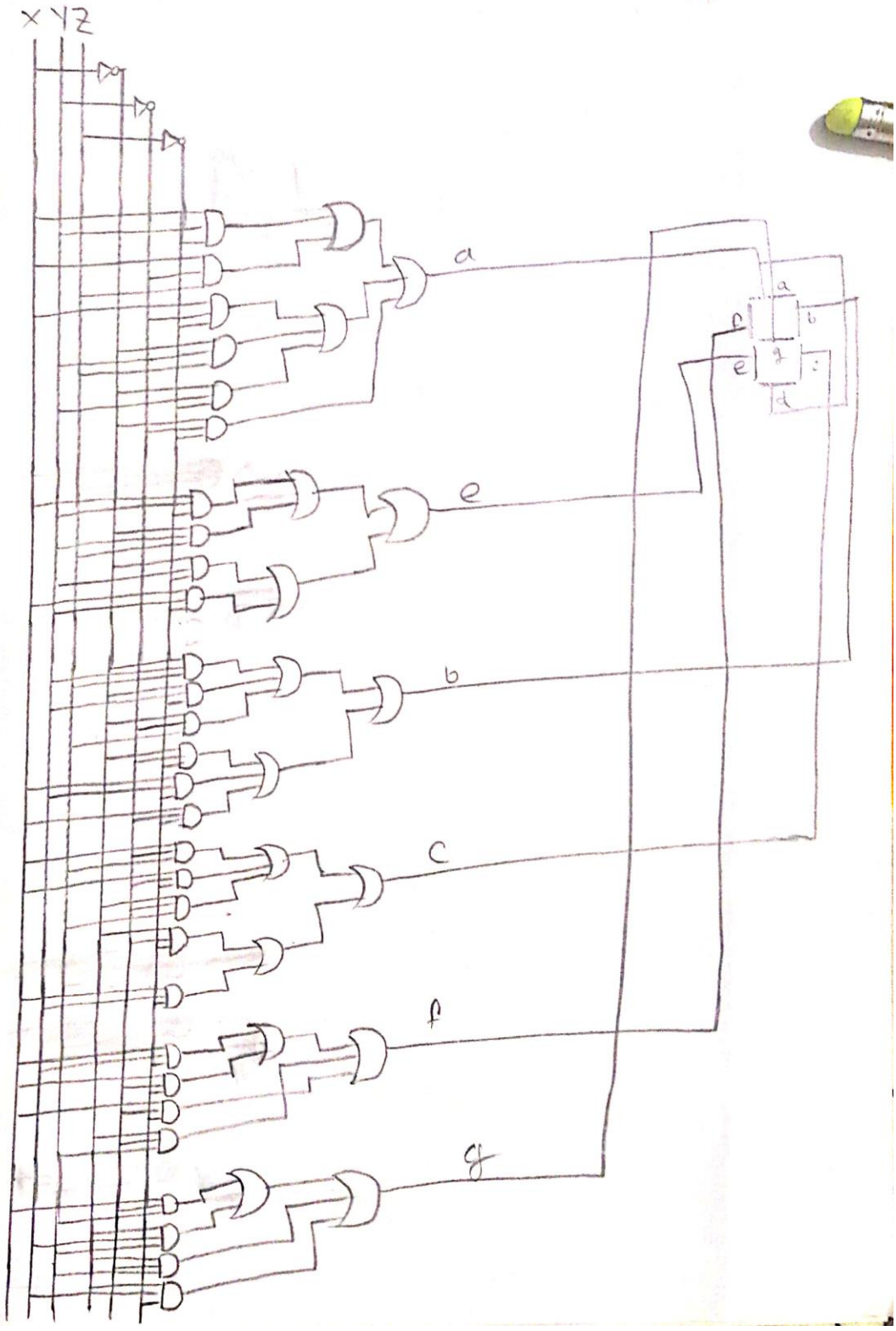
$= xyz' + xy'z + xy'z' + x'y'z$

$g = z + xy$

$g = \Sigma(1,2,3,5)$

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

Generalized SOP circuit with basic gates



⑤ Generalized POS Circuit with Basic gates

$a = \pi(0) = (x+y+z)$

$b = \pi(5) = (x'+y+z')$

$c = \pi(2,3)$

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

$d = \pi(0) = (x+y+z)$

$e = \pi(0,1,5)$

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

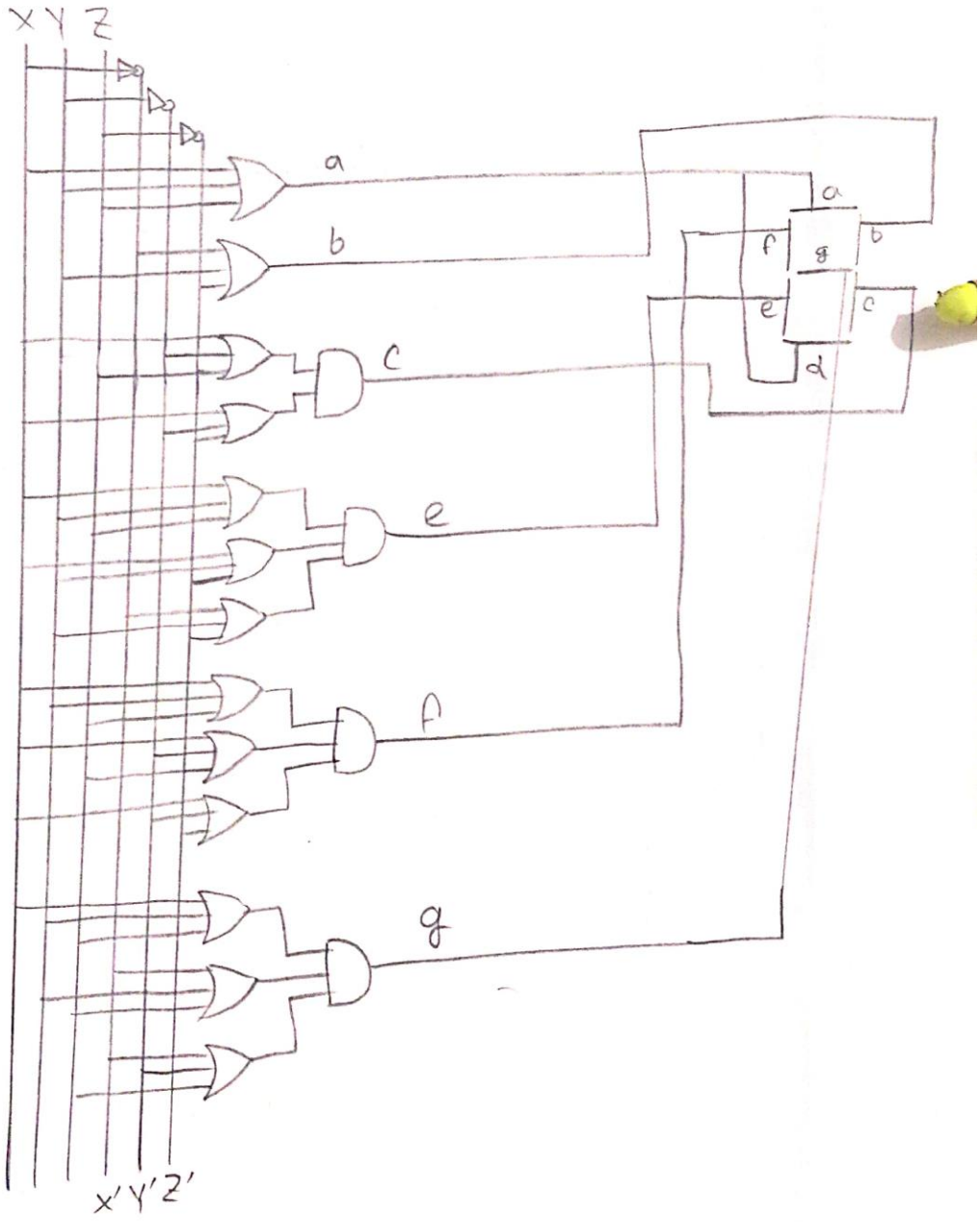
$f = \pi(0,2,3)$

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

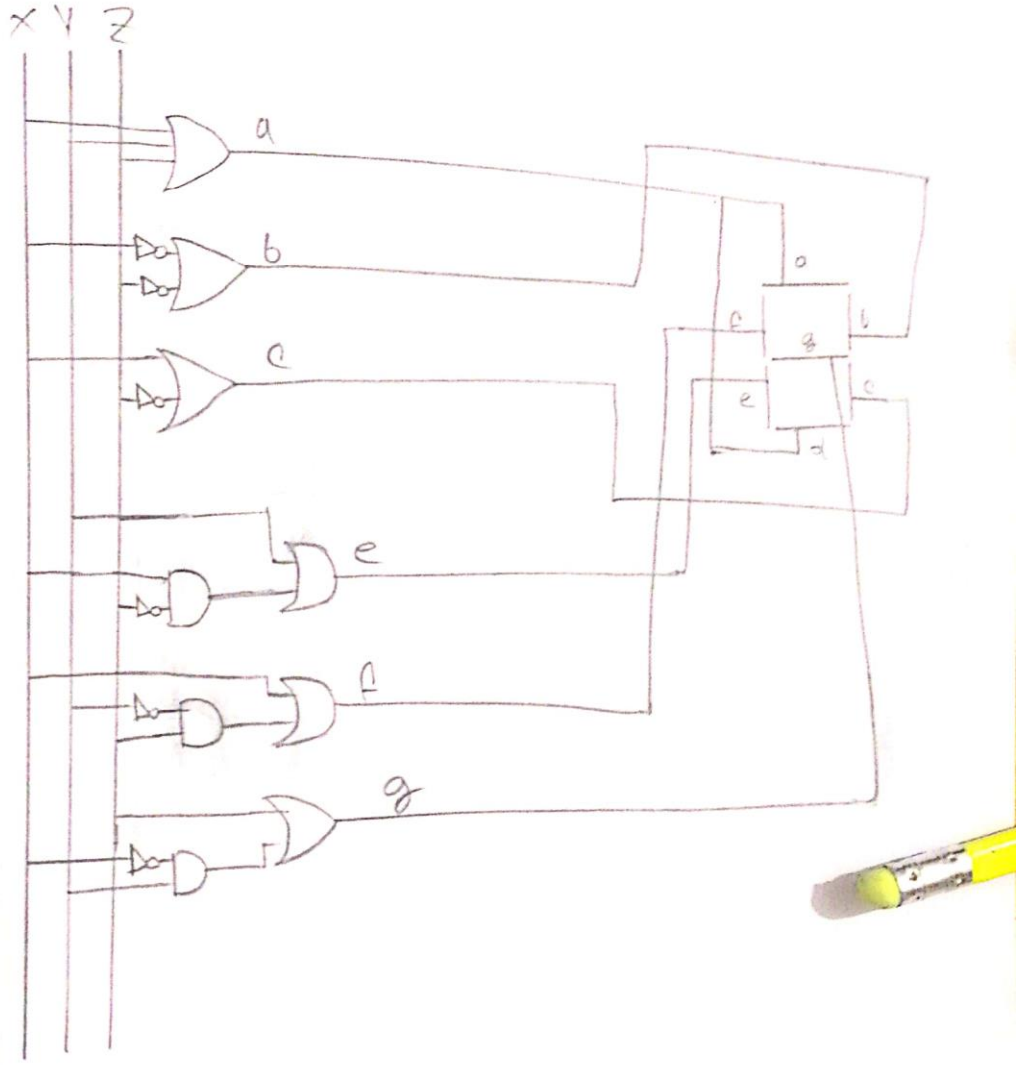
$g = \pi(0,4,6)$

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

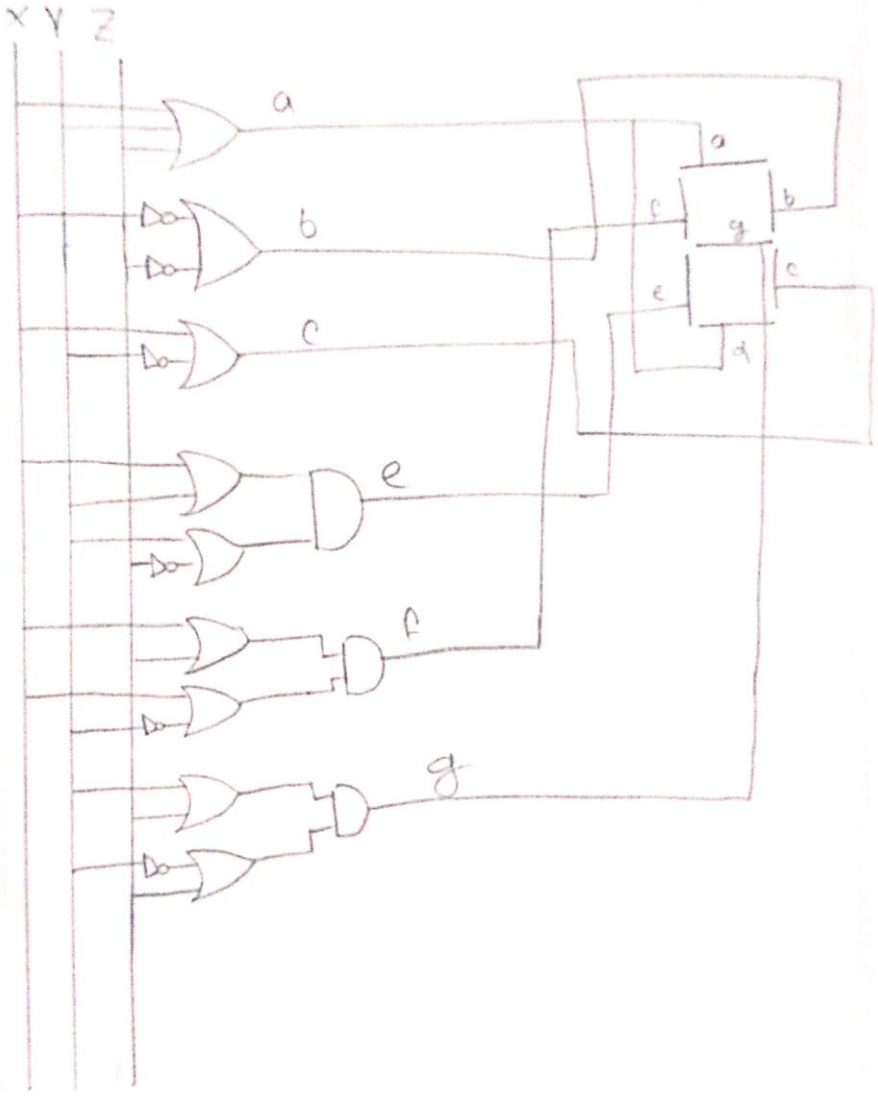
#Generalized POS circuit with basic gates



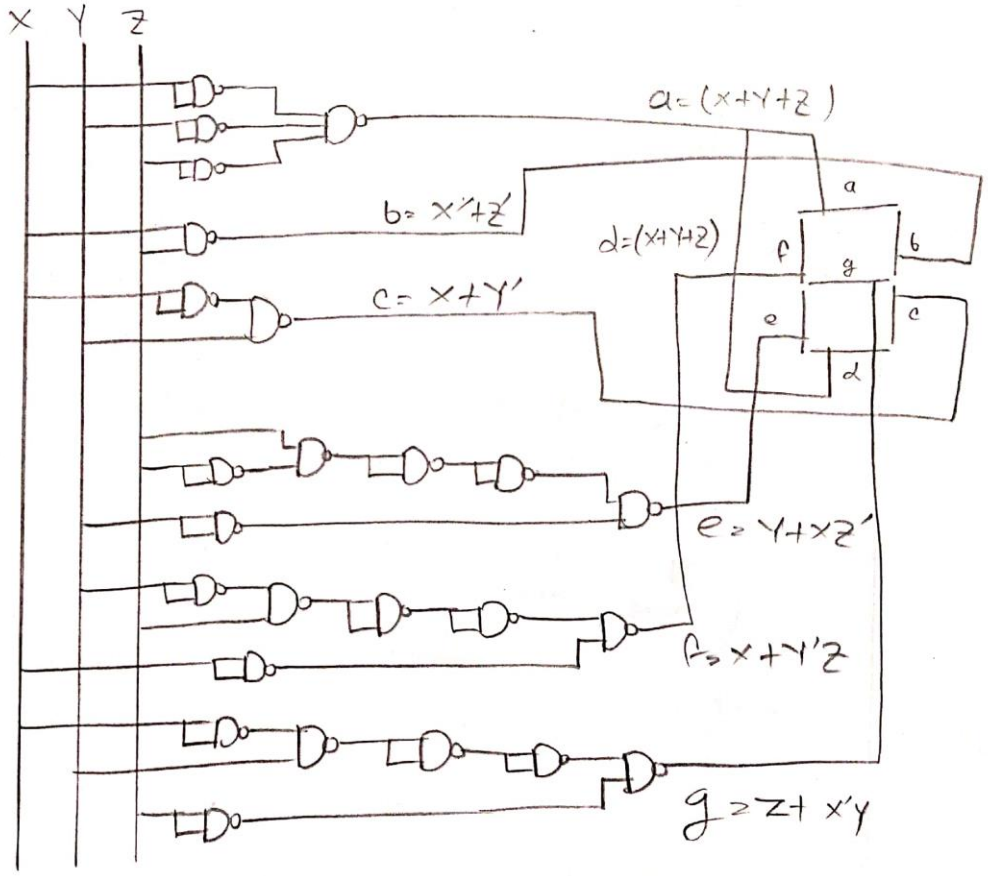
⑥ Simplified SOP circuit with basic gates



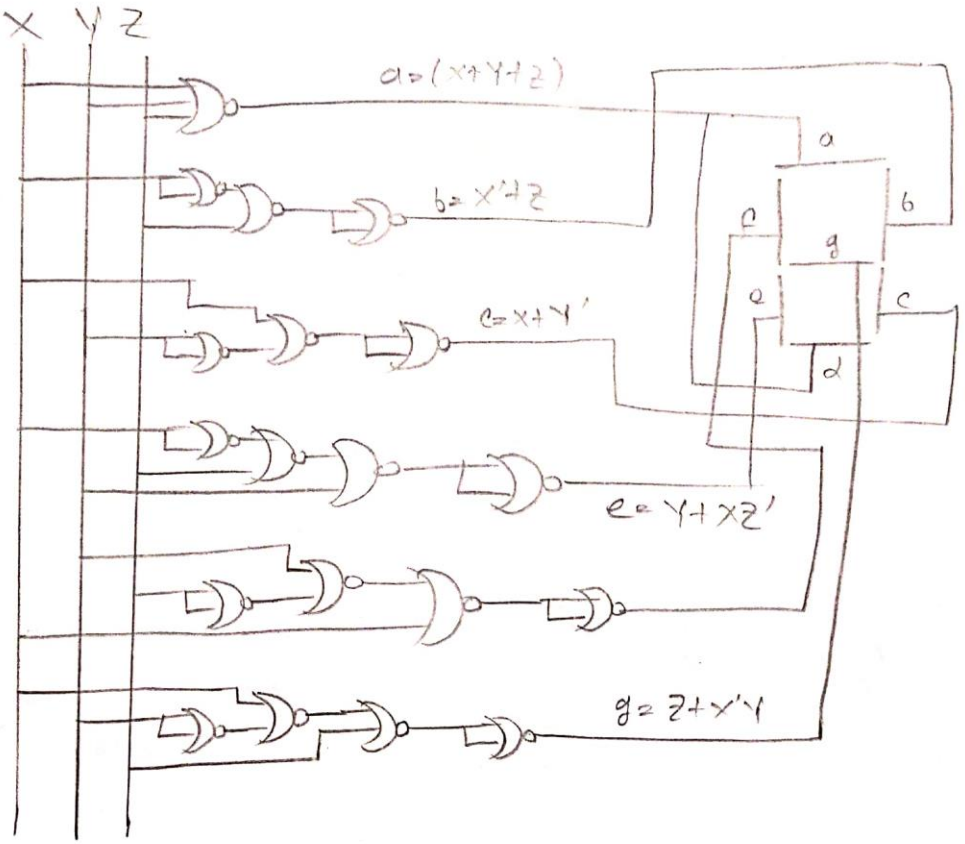
(7) Simplified POS circuit with basic gates



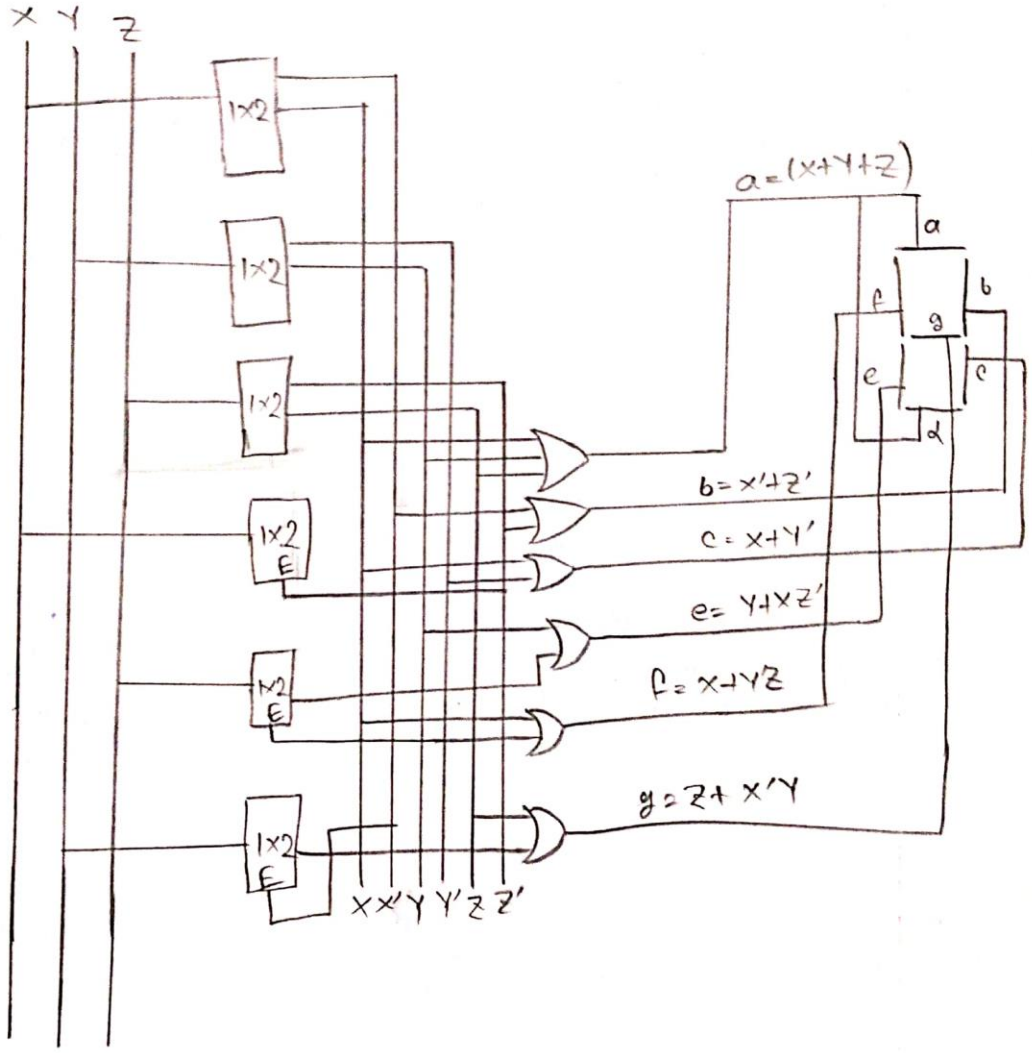
#8 Design the circuit using NAND Gates only



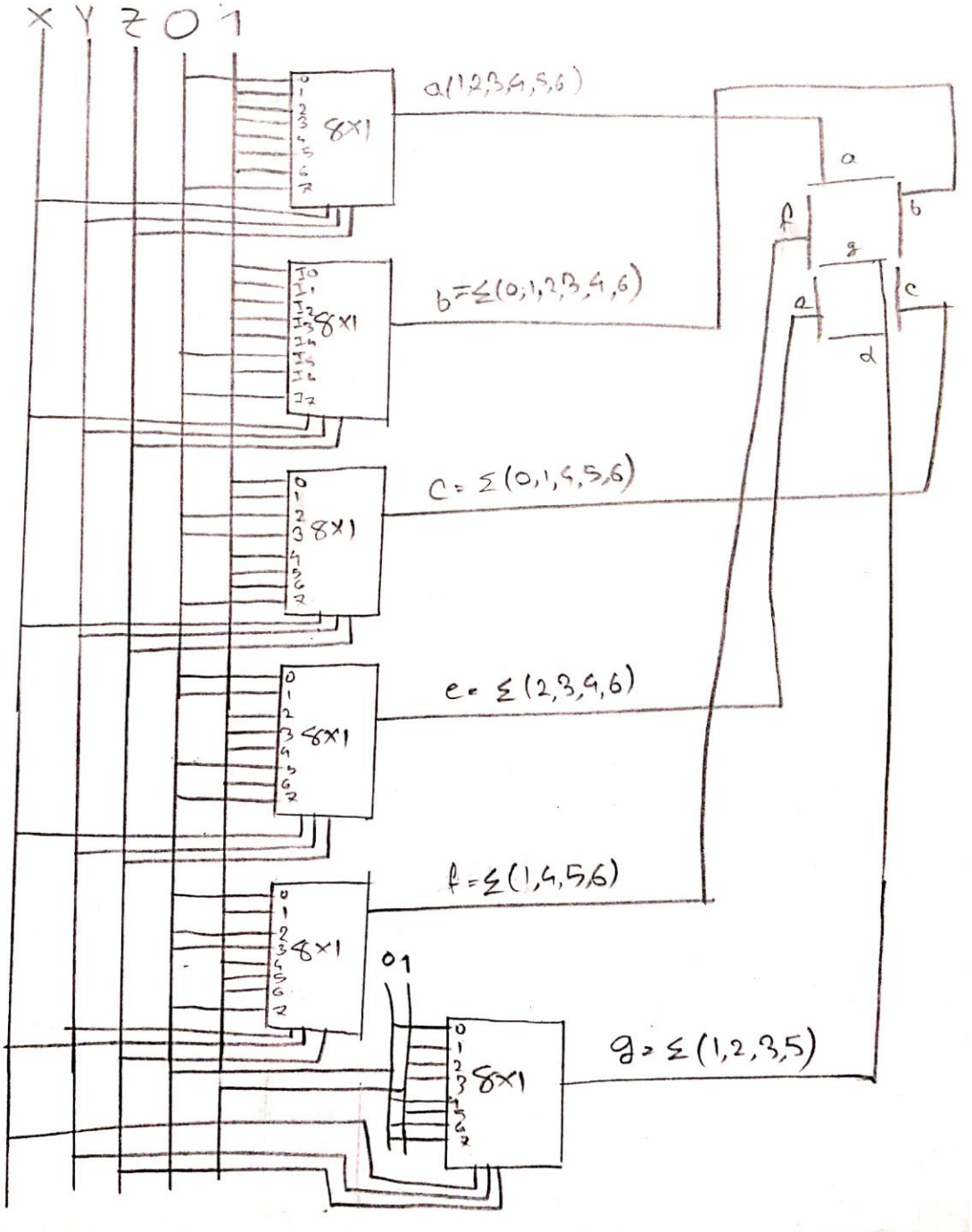
#9 Design the circuit using NOR gates Only



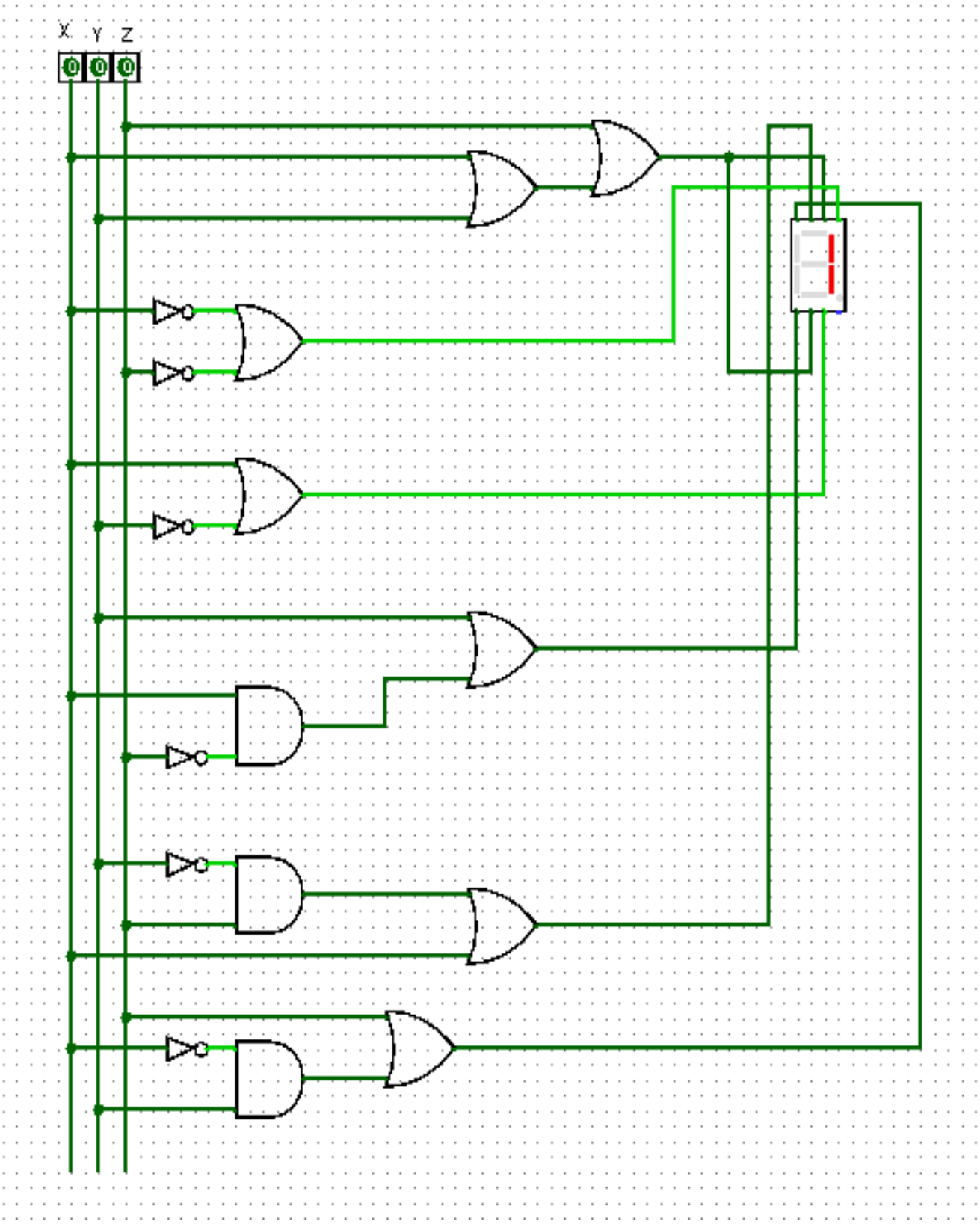
#10 Design the circuit using Decoder & OR gates



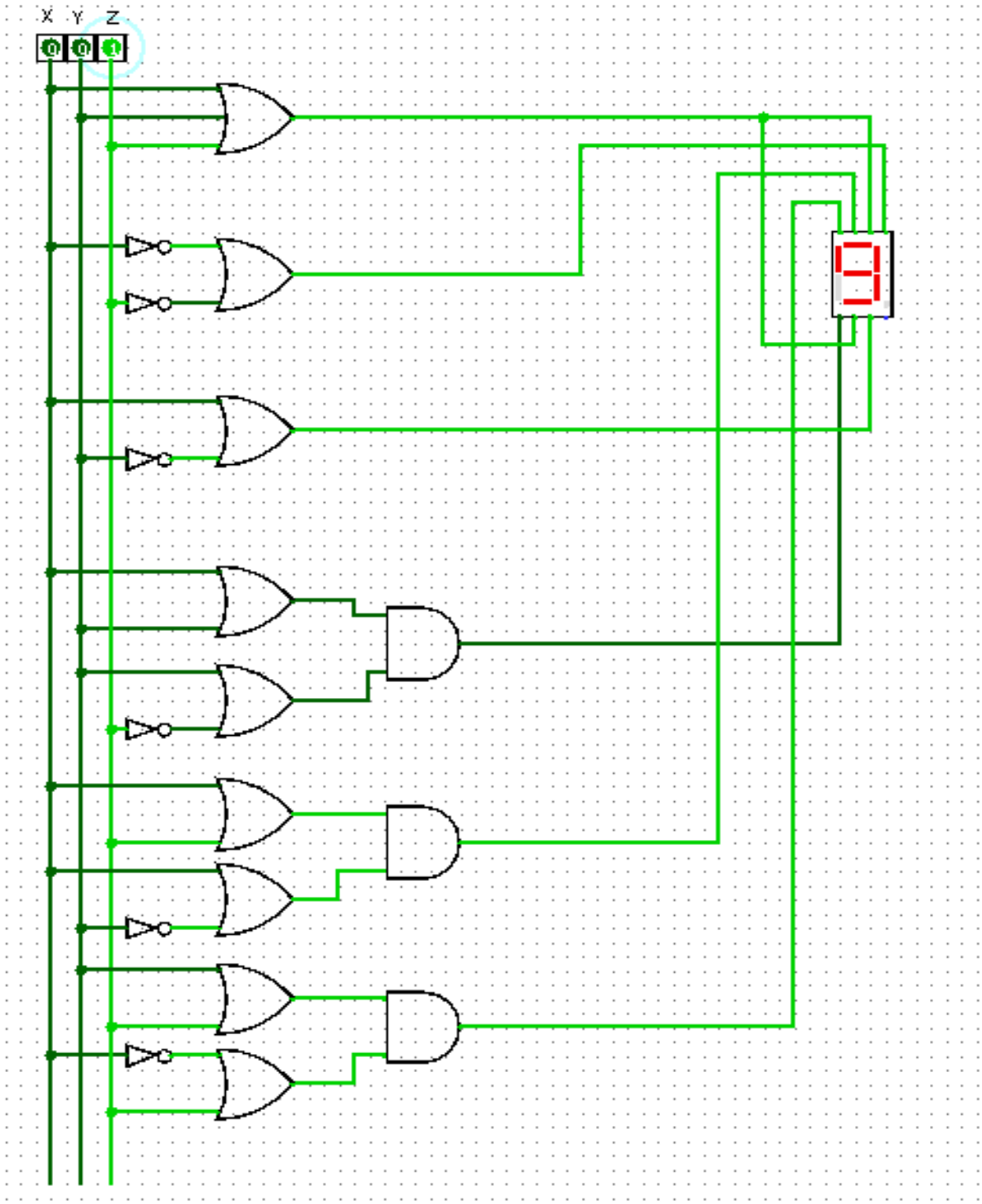
#(11) Design the circuit using Multiplexers.



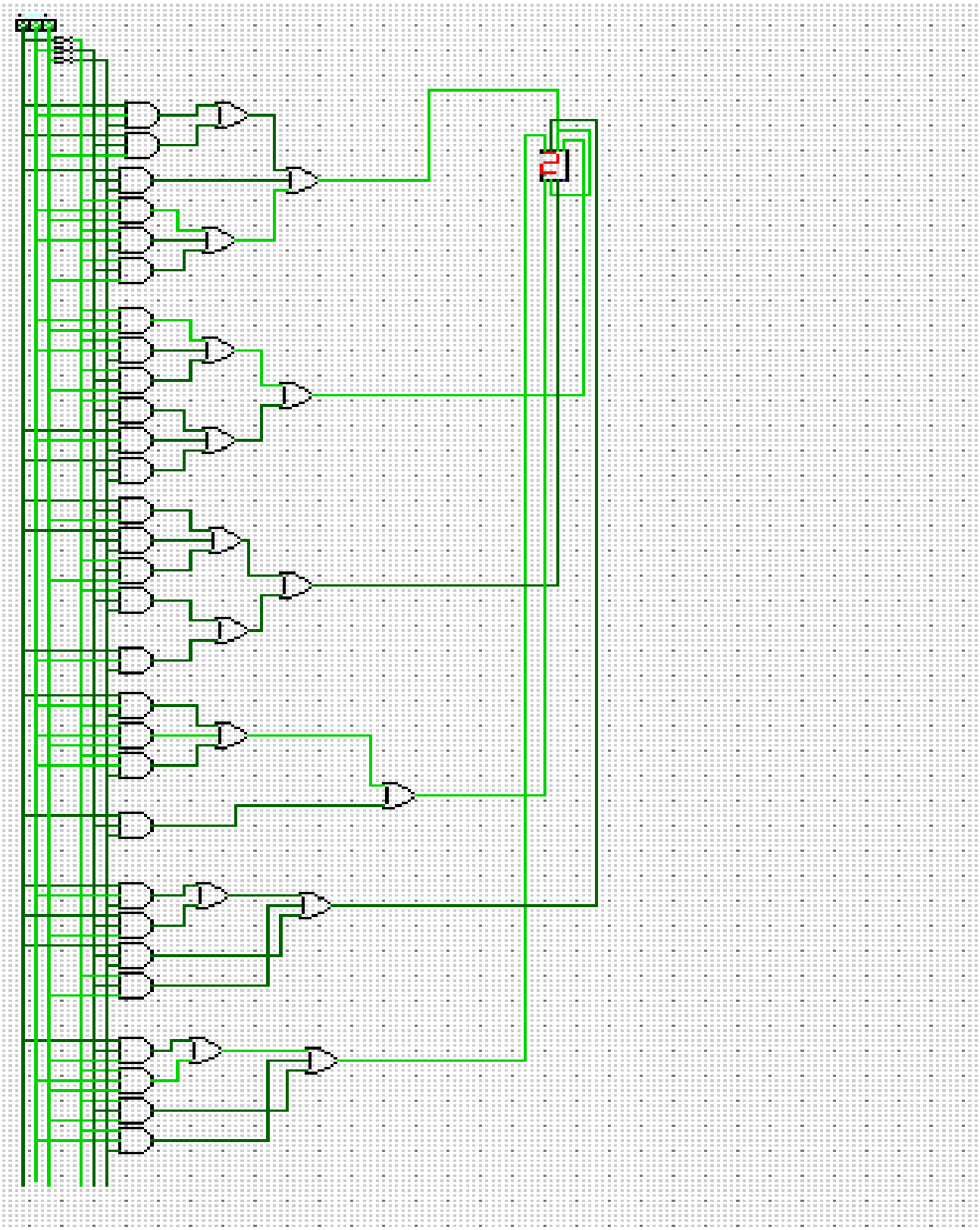
6. Simplified SOP Circuit using Basic Gates in Logisim:



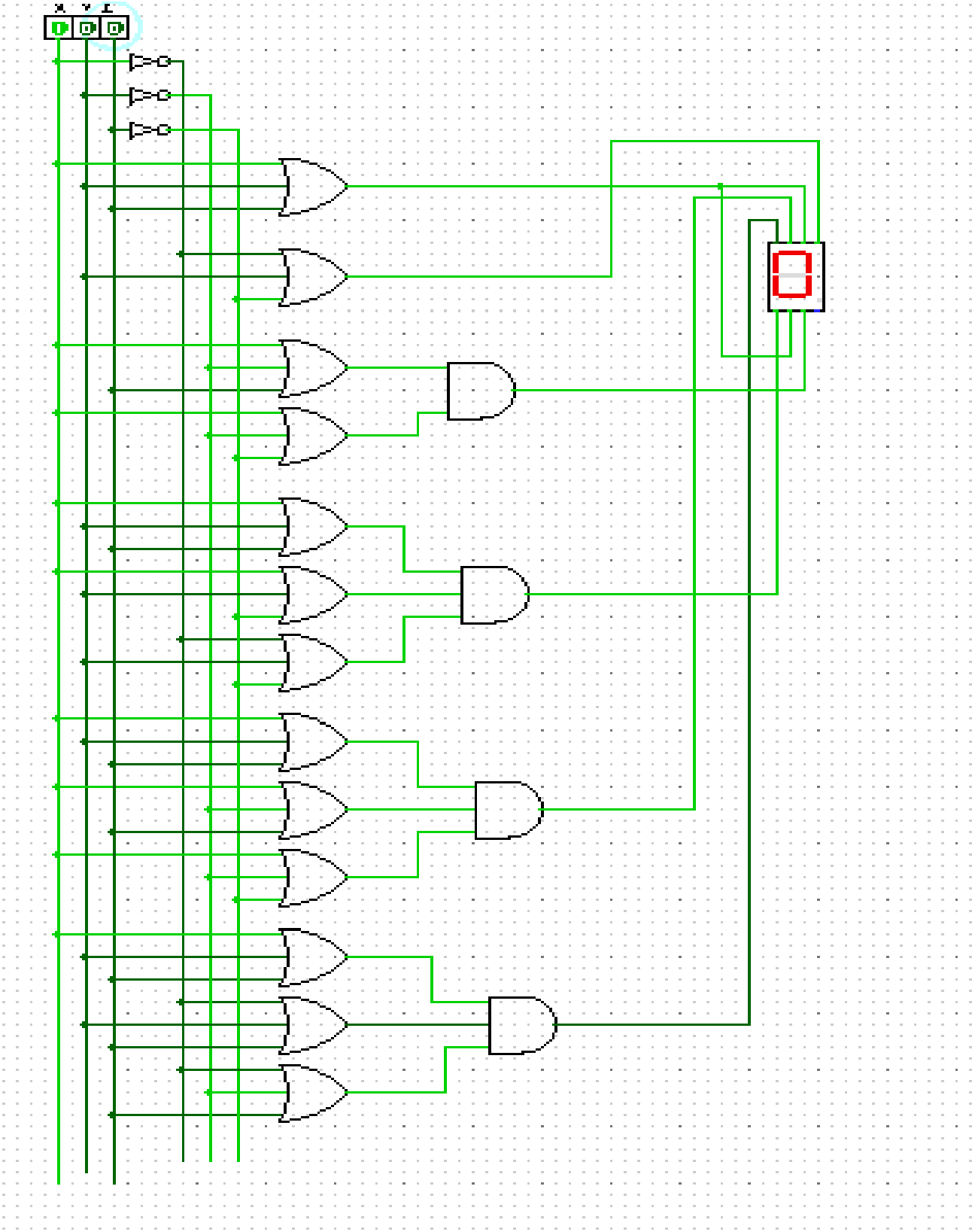
7. Simplified POS Circuit using Basic Gates in Logisim:



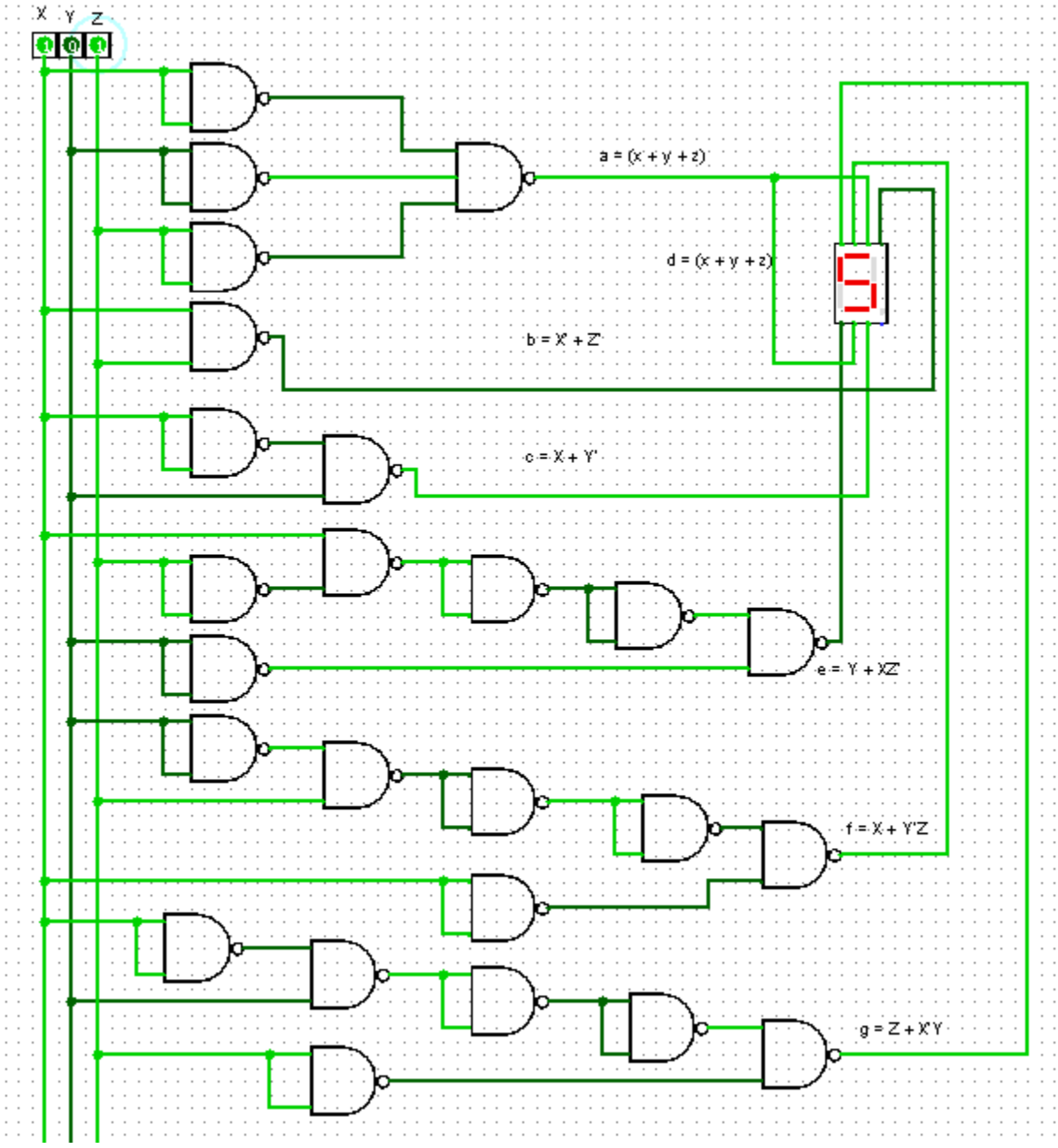
4. Generalized SOP circuit with basic gates in Logisim:



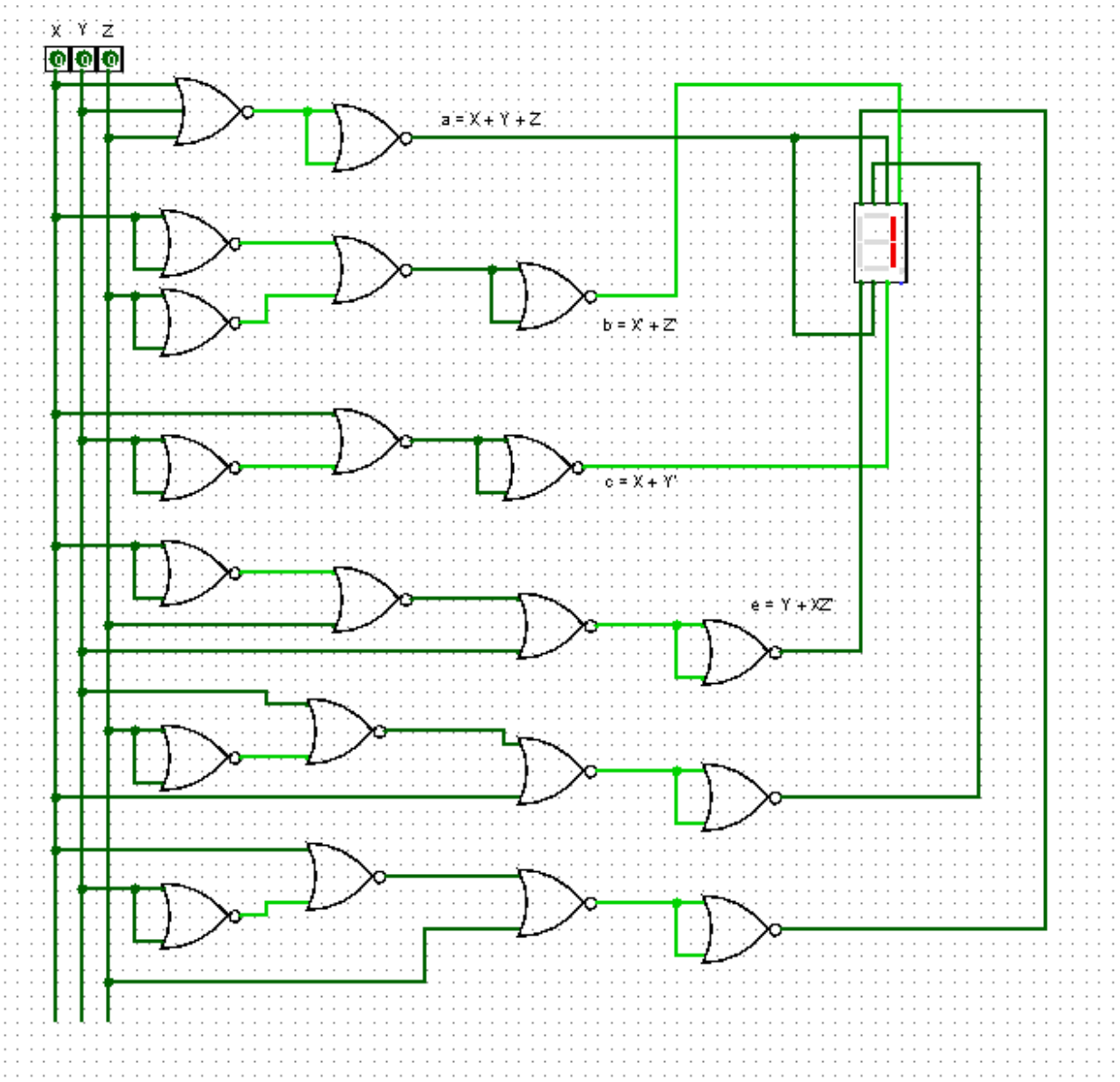
5. Generalized POS circuit with basic gates in Logisim:



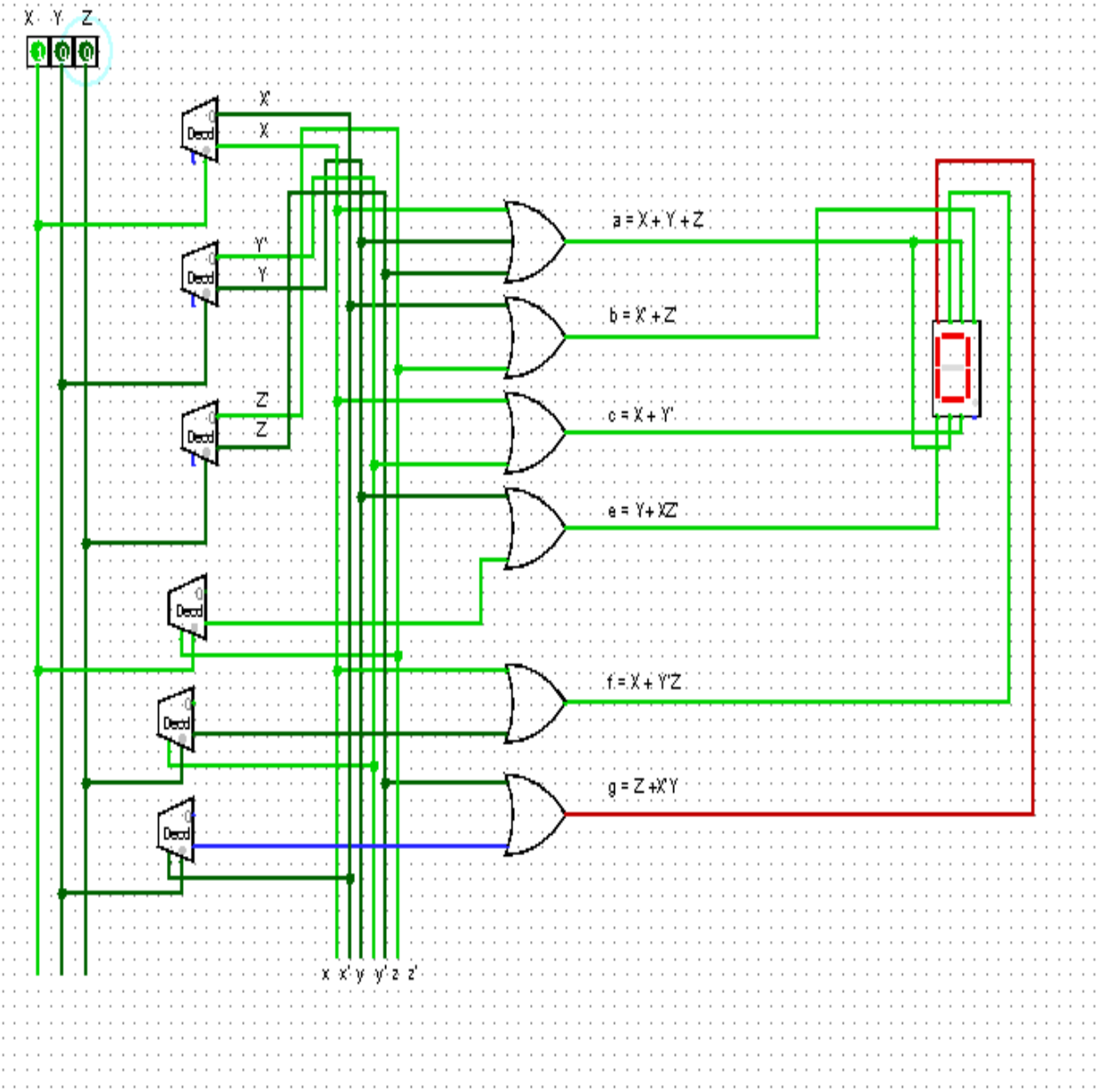
8. Design the circuit using NAND gates only in Logisim:



9. Design the circuit using NOR gates only in Logisim:



10. Design the circuit using Decoder & OR gates:



11. Design the circuit using Multiplexer: