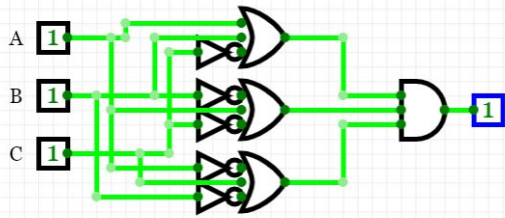
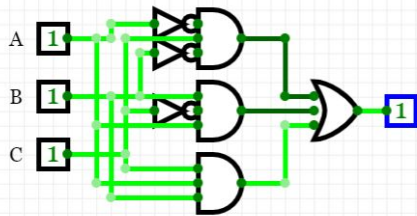


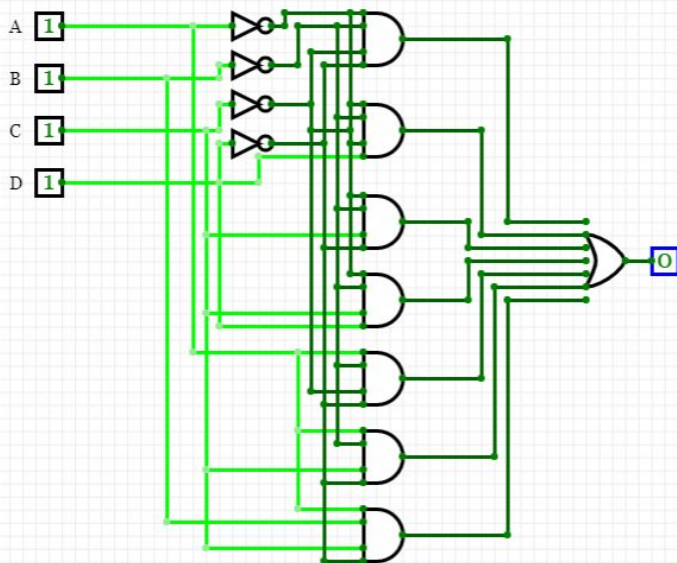
EJERCICIO NO.2 - TABLA NO.1 POS

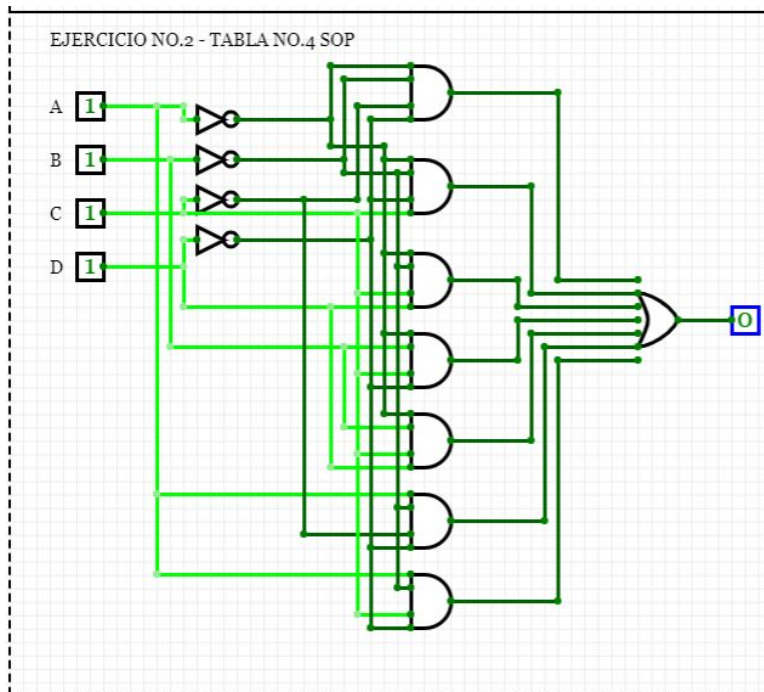


EJERCICIO NO.2 - TABLA NO.2 SOP



EJERCICIO NO.2 - TABLA NO.3 SOP





Link github

https://github.com/god19260/Lab3_FredyGodoy_19260_Digital1.git

Tabla 1-POS

A	B	C	Y	POS	
				maxterm	maxtername
0	0	0	1	$A+B+C$	M0
0	0	1	0	$A+B+C'$	M1
0	1	0	1	$A+B'+C$	M2
0	1	1	0	$A+B'+C'$	M3
1	0	0	1	$A'+B+C$	M4
1	0	1	1	$A'+B+C'$	M5
1	1	0	0	$A'+B'+C$	M6
1	1	1	1	$A'+B'+C'$	M7

$$Y = M_1 \cdot M_3 \cdot M_6 = (A+B+C') \cdot (A+B'+C') \cdot (A'+B'+C)$$

```

C:\Windows\system32\cmd.exe - apio sim
Microsoft Windows [Version 10.0.18363.859]
(c) 2019 Microsoft Corporation. All rights reserved.

E:\Universidad del Valle de Guatemala - Fredy Godoy - 19260\UVG semestre2, año 2020\Digital\Lab 3\Tabla1POS\apio sim
--> WARNING: no PCF file found (-pcf)

iverilog -o Tabla1POS_tb.out -D VCD_OUTPUT=Tabla1POS_tb C:/Users/fredy/.apio/packages/toolchain-yosys/share/yosys/ice40/
cells.sim.v Tabla1POS.v Tabla1POS_tb.v
vvp Tabla1POS_tb.out
A B C | Y
-----|---
0 0 0 | 1
0 0 1 | 0
0 1 0 | 1
0 1 1 | 0
1 0 0 | 1
1 0 1 | 1
1 1 0 | 0
1 1 1 | 1
gtkwave Tabla1POS_tb.vcd Tabla1POS_tb.gtkw
  
```

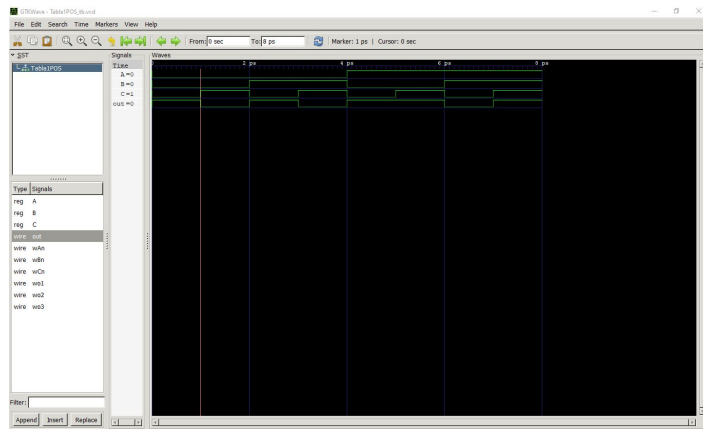


Tabla 1-SOP

Tabla 01				SOP	
A	B	C	Y	minterm	minterm name
0	0	0	1	A'B'C'	m0
0	0	1	0	A'B'C	m1
0	1	0	1	A'BC'	m2
0	1	1	0	A'BC	m3
1	0	0	1	AB'C'	m4
1	0	1	1	AB'C	m5
1	1	0	0	ABC'	m6
1	1	1	1	ABC	m7
$Y = m_0 + m_2 + m_4 + m_5 + m_7 = A'B'C' + A'BC' + AB'C' + AB'C + ABC$					

```

C:\Windows\System32\cmd.exe - apio sim
Microsoft Windows [Version 10.0.18363.959]
(c) 2019 Microsoft Corporation. All rights reserved.

E:\Universidad del Valle de Guatemala - Fredy Godoy - 19260\UVG semestre2, año 2020\Digital\Lab 3\Tabla1SOP>apio sim
--> WARNING: no PCF file found (-pcf)

iverilog -o Tabla1SOP_tb.out -D VCD_OUTPUT=Tabla1SOP_tb C:/Users/fredy/.apio/packages/toolchain-yosys/share/yosys/ice40/
cells_sim.v Tabla1SOP.v Tabla1SOP_tb.v
vvp Tabla1SOP_tb.out
A B C | Y
-----|---
0 0 0 | 1
0 0 1 | 0
0 1 0 | 1
0 1 1 | 0
1 0 0 | 1
1 0 1 | 1
1 1 0 | 0
1 1 1 | 1
gtkwave Tabla1SOP_tb.vcd Tabla1SOP_tb.gtkw

```

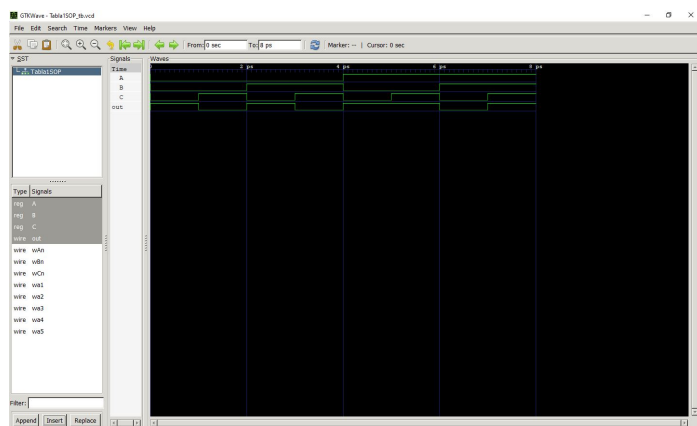


Tabla 2- POS

				POS	
A	B	C	Y	maxterm	maxtername
0	0	0	0	A+B+C	M0
0	0	1	1	A+B+C'	M1
0	1	0	0	A+B'+C	M2
0	1	1	0	A+B'+C'	M3
1	0	0	0	A'+B+C	M4
1	0	1	0	A'+B+C'	M5
1	1	0	1	A'+B'+C	M6
1	1	1	1	A'+B'+C'	M7

$$Y = M_0 \cdot M_2 \cdot M_3 \cdot M_4 \cdot M_5 = (A+B+C) \cdot (A+B'+C) \cdot (A+B'+C') \cdot (A'+B+C) \cdot (A'+B+C')$$

```

C:\Windows\System32\cmd.exe - apio sim
Microsoft Windows [Version 10.0.18363.959]
(c) 2019 Microsoft Corporation. All rights reserved.

E:\Universidad del Valle de Guatemala - Fredy Godoy - 19260\UVG semestre2, año 2020\Digital\Lab 3\Tabla2POS>apio sim
--> WARNING: no PCF file found (.pcf)

iverilog -o Tabla2POS_tb.out -D VCD_OUTPUT=Tabla2POS_tb C:/Users/Fredy/.apio/packages/toolchain-yosys/share/yosys/ice40/
cells_sim.v Tabla2POS.v Tabla2POS_tb.v
vvp Tabla2POS_tb.out
A B C | Y
-----|---
VCD info: dumpfile Tabla2POS_tb.vcd opened for output.
0 0 0 | 0
0 0 1 | 1
0 1 0 | 0
0 1 1 | 0
1 0 0 | 0
1 0 1 | 0
1 1 0 | 1
1 1 1 | 1
gtkwave Tabla2POS_tb.vcd Tabla2POS_tb.gtkw
  
```

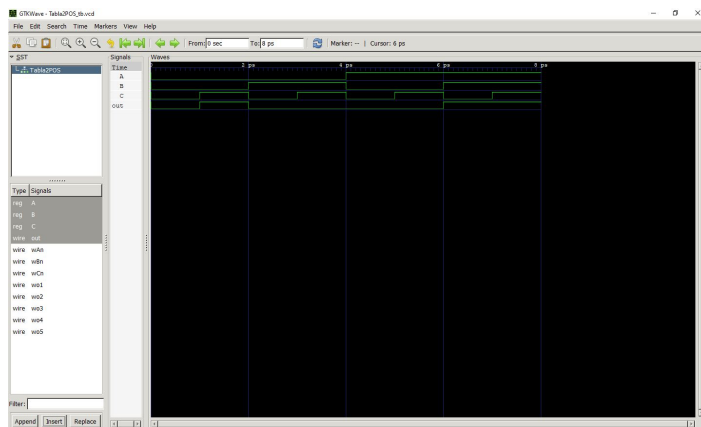


Tabla 2-SOP

Tabla 02				SOP	
A	B	C	Y	minterm	minterm name
0	0	0	0	A'B'C'	m0
0	0	1	1	A'B'C	m1
0	1	0	0	A'BC'	m2
0	1	1	0	A'BC	m3
1	0	0	0	AB'C'	m4
1	0	1	0	AB'C	m5
1	1	0	1	ABC'	m6
1	1	1	1	ABC	m7

$$Y = m_1 + m_6 + m_7 = A'B'C + ABC' + ABC$$

```
Select C:\Windows\System32\cmd.exe - apio sim
Microsoft Windows [Version 10.0.18363.959]
(c) 2019 Microsoft Corporation. All rights reserved.

E:\Universidad del Valle de Guatemala - Fredy Godoy - 19260\UVG semestre2, año 2020\Digital\Lab 3\Tabla2SOP>apio sim
...-> WARNING: no PCF file found (-pcf)

vvp Tabla2SOP_tb.out
A B C | Y
-----|---
0 0 0 | 0
0 0 1 | 1
0 1 0 | 0
0 1 1 | 0
1 0 0 | 0
1 0 1 | 0
1 1 0 | 1
1 1 1 | 1
gtkwave Tabla2SOP_tb.vcd Tabla2SOP_tb.gtkw
```

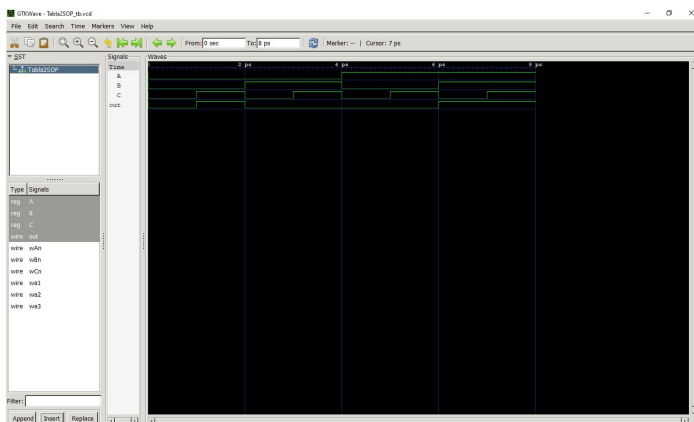


Tabla 3 - POS

					POS	
A	B	C	D	Y	minterm	minterm name
0	0	0	0	1	A+B+C+D	M0
0	0	0	1	1	A+B+C+D'	M1
0	0	1	0	1	A+B+C'+D	M2
0	0	1	1	1	A+B+C'+D'	M3
0	1	0	0	0	A+B'+C+D	M4
0	1	0	1	0	A+B'+C+D'	M5
0	1	1	0	0	A+B'+C'+D	M6
0	1	1	1	0	A+B'+C'+D'	M7
1	0	0	0	1	A'+B+C+D	M8
1	0	0	1	0	A'+B+C+D'	M9
1	0	1	0	1	A'+B+C'+D	M10
1	0	1	1	0	A'+B+C'+D'	M11
1	1	0	0	0	A'+B'+C+D	M12
1	1	0	1	0	A'+B'+C+D'	M13
1	1	1	0	1	A'+B'+C'+D	M14
1	1	1	1	0	A'+B'+C'+D'	M15

$$Y = M_4 \cdot M_5 \cdot M_6 \cdot M_7 \cdot M_9 \cdot M_{11} \cdot M_{12} \cdot M_{13} \cdot M_{15}$$

$$= (A+B'+C+D) \cdot (A+B'+C+D') \cdot (A+B'+C'+D) \cdot (A+B'+C'+D') \cdot (A'+B+C+D') \cdot (A'+B+C'+D') \cdot (A'+B'+C+D) \cdot (A'+B'+C+D') \cdot (A'+B'+C'+D')$$

```

C:\Windows\System32\cmd.exe - apio sim
[SUCCESS] Took 0.29 seconds
E:\Universidad del Valle de Guatemala - Fredy Godoy - 19260\UNG semestre2, año 2020\Digital\Lab 3\Tabla3POS>apio sim
--> WARNING: no PCF file found (-pcf)
iverilog -o Tabla3POS_tb.out -D VCD_OUTPUT=Tabla3POS_tb C:/Users/fredy/.apio/packages/toolchain-yosys/share/yosys/ice40/
cells_sim.v Tabla3POS.v Tabla3POS_tb.v
vvp Tabla3POS_tb.out
A B C D| Y
-----|---
VCD info: dumpfile Tabla3POS_tb.vcd opened for output.
0 0 0 0| 1
0 0 0 1| 1
0 0 1 0| 1
0 0 1 1| 1
0 1 0 0| 0
0 1 0 1| 0
0 1 1 0| 0
0 1 1 1| 0
1 0 0 0| 1
1 0 0 1| 0
1 0 1 0| 1
1 0 1 1| 0
1 1 0 0| 0
1 1 0 1| 0
1 1 1 0| 1
1 1 1 1| 0
gtkwave Tabla3POS_tb.vcd Tabla3POS_tb.gtkw

```

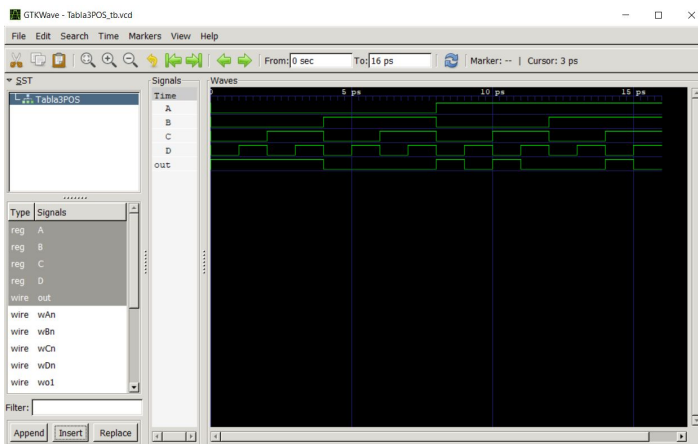


Tabla 3 - SOP

Tabla 03					SOP	
A	B	C	D	Y	minterm	minterm name
0	0	0	0	1	A'B'C'D'	m0
0	0	0	1	1	A'B'C'D	m1
0	0	1	0	1	A'B'CD'	m2
0	0	1	1	1	A'B'CD	m3
0	1	0	0	0	A'BC'D'	m4
0	1	0	1	0	A'BC'D	m5
0	1	1	0	0	A'BCD'	m6
0	1	1	1	0	A'BCD	m7
1	0	0	0	1	AB'C'D'	m8
1	0	0	1	0	AB'C'D	m9
1	0	1	0	1	AB'CD'	m10
1	0	1	1	0	AB'CD	m11
1	1	0	0	0	ABC'D'	m12
1	1	0	1	0	ABC'D	m13
1	1	1	0	1	ABCD'	m14
1	1	1	1	0	ABCD	m15

$$Y = m_0 + m_1 + m_2 + m_3 + m_8 + m_{10} + m_{14} = A'B'C'D' + A'B'C'D + A'B'CD' + A'B'CD + AB'CD' + ABCD'$$

```
Select C:\Windows\System32\cmd.exe - apio sim
===== [SUCCESS] Took 0.29 seconds =====
E:\Universidad del Valle de Guatemala - Fredy Godoy - 19260\UWG semestre2, año 2020\Digital\Lab 3\Tabla3SOP>apio sim
--> WARNING: no PCF file found (.pcf)
iverilog -o Tabla3SOP_tb.out -D VCD_OUTPUT=Tabla3SOP_tb C:/Users/fredy/.apio/packages/toolchain-yosys/share/yosys/ice40/
vvp Tabla3SOP_tb.out
A,B,C,D,Y
-----|--
VCD info: dumpfile Tabla3SOP_tb.vcd opened for output.
0 0 0 0 1
0 0 0 1 1
0 0 1 0 1
0 0 1 1 1
0 1 0 0 0
0 1 0 1 0
0 1 1 0 0
0 1 1 1 0
1 0 0 0 1
1 0 0 1 0
1 0 1 0 1
1 0 1 1 0
1 1 0 0 0
1 1 0 1 0
1 1 1 0 1
1 1 1 1 0
gtkwave Tabla3SOP_tb.vcd Tabla3SOP_tb.gtkw
```

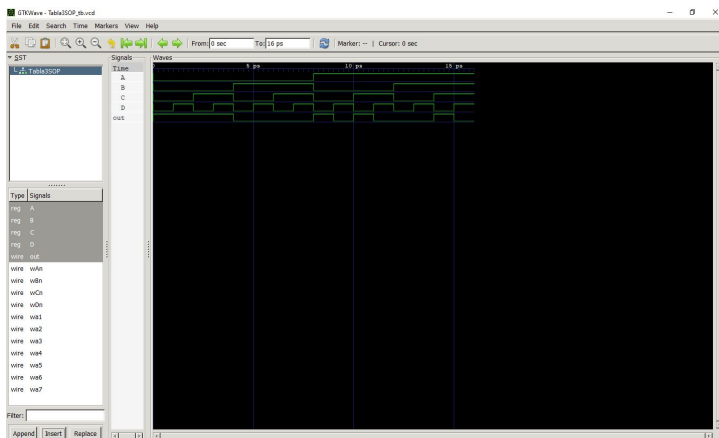


Tabla 4 - POS

					POS	
A	B	C	D	Y	minterm	minterm name
0	0	0	0	1	A+B+C+D	M0
0	0	0	1	0	A+B+C+D'	M1
0	0	1	0	1	A+B+C'+D	M2
0	0	1	1	1	A+B+C'+D'	M3
0	1	0	0	0	A+B'+C+D	M4
0	1	0	1	0	A+B'+C+D'	M5
0	1	1	0	1	A+B'+C'+D	M6
0	1	1	1	1	A+B'+C'+D'	M7
1	0	0	0	1	A'+B+C+D	M8
1	0	0	1	0	A'+B+C+D'	M9
1	0	1	0	1	A'+B+C'+D	M10
1	0	1	1	0	A'+B+C'+D'	M11
1	1	0	0	0	A'+B'+C+D	M12
1	1	0	1	0	A'+B'+C+D'	M13
1	1	1	0	0	A'+B'+C'+D	M14
1	1	1	1	0	A'+B'+C'+D'	M15

$$Y = M_1 \cdot M_4 \cdot M_5 \cdot M_9 \cdot M_{11} \cdot M_{12} \cdot M_{13} \cdot M_{14} \cdot M_{15}$$

$$= (A+B+C+D') \cdot (A+B'+C+D) \cdot (A+B'+C+D') \cdot (A'+B+C+D') \cdot (A'+B+C'+D') \cdot (A'+B'+C+D) \cdot (A'+B'+C+D') \cdot (A'+B'+C'+D) \cdot (A'+B'+C'+D')$$

```
C:\Windows\System32\cmd.exe - apio sim

===== [SUCCESS] Took 0.30 seconds =====
E:\Universidad del Valle de Guatemala - Fredy Godoy - 19260\UWG semestre2, año 2020\Digital\Lab 3\Tabla4POS>apio sim
--> WARNING: no PCF file found (.pcf)
iverilog -o Tabla4POS_tb.out -D VCD_OUTPUT=Tabla4POS_tb C:/Users/fredy/.apio/packages/toolchain-yosys/share/yosys/ice40/
cells_sim.v Tabla4POS.v Tabla4POS_tb.v
vvp Tabla4POS_tb.out
A B C D | Y
-----|---
VCD info: dumpfile Tabla4POS_tb.vcd opened for output.
0 0 0 0 | 1
0 0 0 1 | 0
0 0 1 0 | 1
0 0 1 1 | 1
0 1 0 0 | 0
0 1 0 1 | 0
0 1 1 0 | 1
0 1 1 1 | 1
1 0 0 0 | 1
1 0 0 1 | 0
1 0 1 0 | 1
1 0 1 1 | 0
1 1 0 0 | 0
1 1 0 1 | 0
1 1 1 0 | 0
1 1 1 1 | 0
gtkwave Tabla4POS_tb.vcd Tabla4POS_tb.gtkw
```

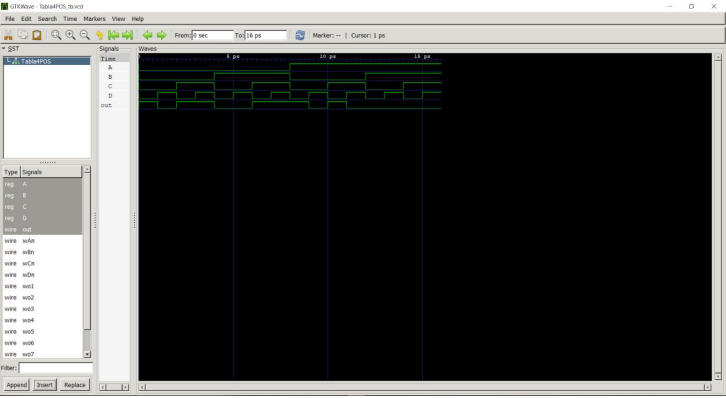
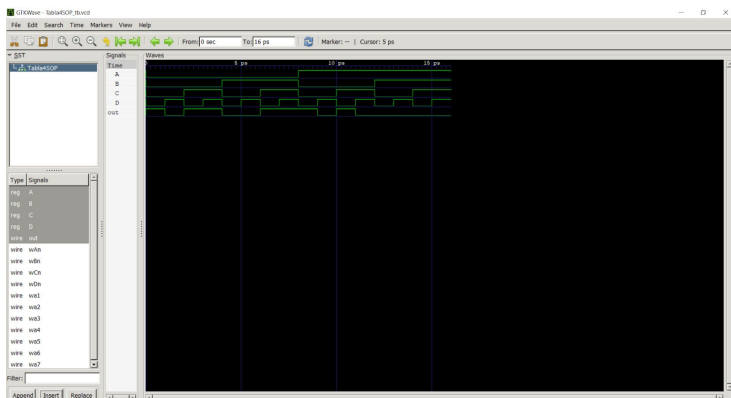


Tabla 4 - SOP

Tabla 04					SOP	
A	B	C	D	Y	minterm	minterm name
0	0	0	0	1	A'B'C'D'	m0
0	0	0	1	0	A'B'C'D	m1
0	0	1	0	1	A'B'CD'	m2
0	0	1	1	1	A'B'CD	m3
0	1	0	0	0	A'BC'D'	m4
0	1	0	1	0	A'BC'D	m5
0	1	1	0	1	A'BCD'	m6
0	1	1	1	1	A'BCD	m7
1	0	0	0	1	AB'C'D'	m8
1	0	0	1	0	AB'C'D	m9
1	0	1	0	1	AB'CD'	m10
1	0	1	1	0	AB'CD	m11
1	1	0	0	0	ABC'D'	m12
1	1	0	1	0	ABC'D	m13
1	1	1	0	0	ABCD'	m14
1	1	1	1	0	ABCD	m15

$$Y = m_0 + m_2 + m_3 + m_6 + m_7 + m_8 + m_{10} = A'B'C'D' + A'B'CD' + A'B'CD + A'BCD' + A'BCD + AB'C'D' + AB'CD'$$

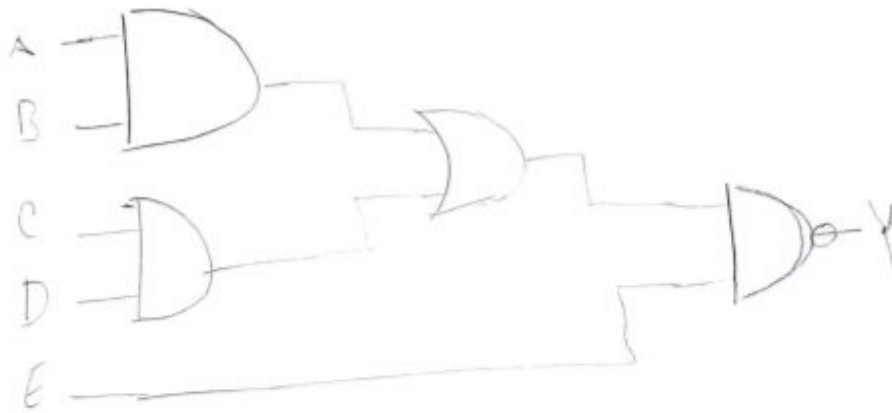
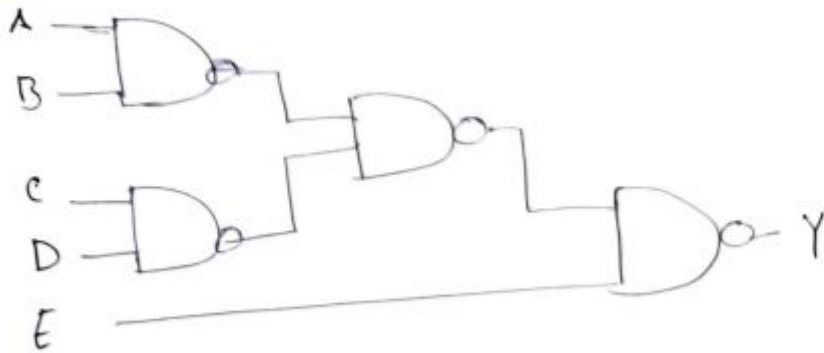
```
C:\Windows\System32\cmd.exe - apio sim
E:\Universidad del Valle de Guatemala - Fredy Godoy - 19260\UNG semestre2, año 2020\Digital\Lab 3\Tabla4SOP>apio sim
--> WARNING: no PCF file found (.pcf)
iverilog -o Tabla4SOP_tb.out -D VCD_OUTPUT=Tabla4SOP_tb C:/Users/fredy/.apio/packages/toolchain-yosys/share/yosys/ice40/
cells_sim.v Tabla4SOP.v Tabla4SOP_tb.v
vvp Tabla4SOP_tb.out
A B C D Y
-----
VCD info: dumpfile Tabla4SOP_tb.vcd opened for output.
0 0 0 0 1
0 0 0 1 0
0 0 1 0 1
0 0 1 1 1
0 0 1 1 1
0 1 0 0 0
0 1 0 1 0
0 1 1 0 1
0 1 1 1 1
1 0 0 0 1
1 0 0 1 0
1 0 1 0 1
1 0 1 1 0
1 1 0 0 0
1 1 0 1 0
1 1 1 0 0
1 1 1 1 0
gtkwave Tabla4SOP_tb.vcd Tabla4SOP_tb.gtkw
```



Ejercicio 4

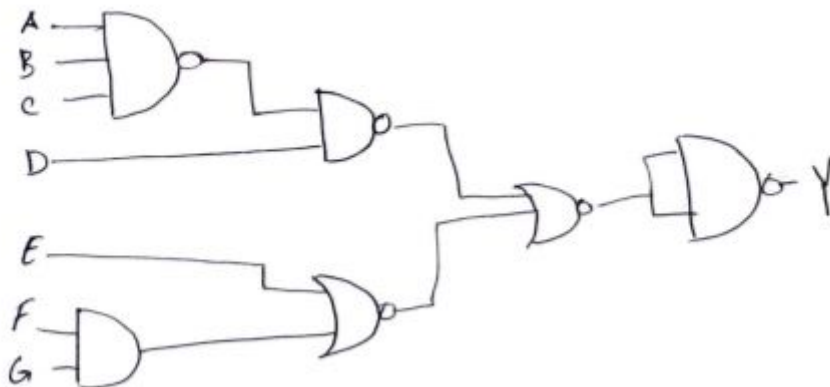
Ejercicio no.4

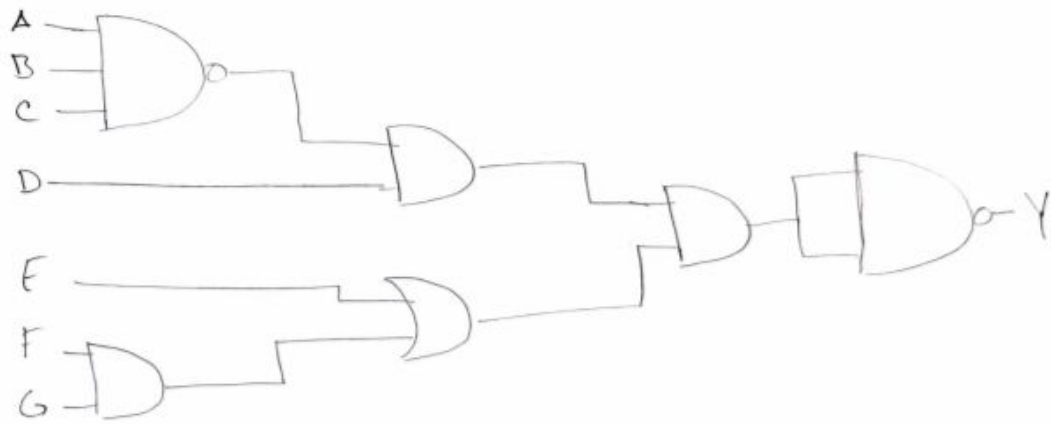
1



$$\overline{[(AB) + (CD)] E} = Y$$

6





$$\left[\overline{(ABC)} \cdot D \cdot [E + (FG)] \right] \cdot \left[\overline{(ABC)} \cdot D [E + (FG)] \right] = Y$$