CMP 215
Boolean Algebra And Logic Gate

Binary

0 → Off → F → 0 volts

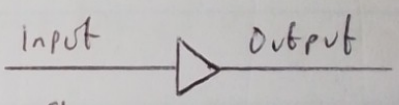
1 → ON → T → 5 volts (Can be anything but not zero)

WHEN DEALING WITH CIRCUITS (0)
When dealing with Circuits Zero Corresponds to being in the off state and 1 (One) Corresponds to being in the ON state

WHEN DEALING WITH TRUTH TABLE
0 corresponds to F (false)
1 Corosponds to T (true)

WHEN DEALING WITH VOLTAGE
An OFF state will have 0 volts
An ON state will represent Something order than ZERO

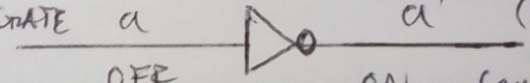
1) BUFFER GATE



(whenever a (input) is, a (output) will be the same)

A (input)	Out (output)
1	1
0	0

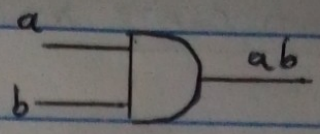
2) NOT GATE



(and vice versa)

a (input)	Out output
0	1
1	0

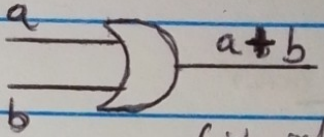
3) AND GATE



a	b	out
0	0	0
1	0	0
0	1	0
1	1	1

(a and b must be ON for us to get an Output ON state

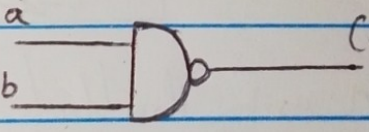
4) OR GATE



a	b	output
0	0	0
1	0	1
0	1	1
1	1	1

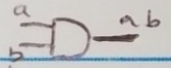
(We only get an OFF state if a and b are off else we get an ON)

5) NAND GATE



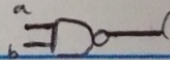
• Opposite of the AND GATE

AND



a	b	ab
0	0	0
1	0	0
0	1	0
1	1	1

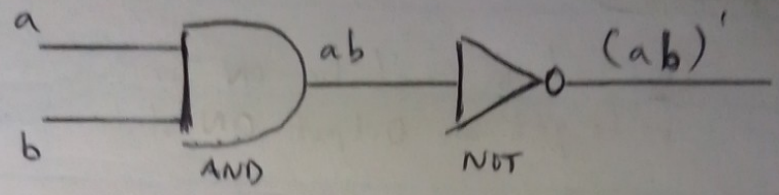
NAND



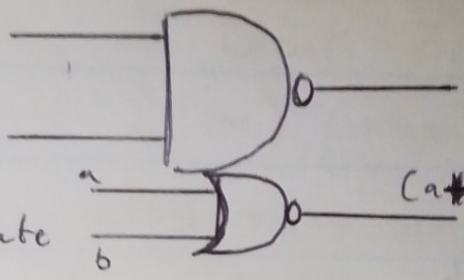
a	b	ab
0	0	1
1	0	1
0	1	1
1	1	0

NAND is basically the Compliment or opposite of AND

The Combination of a AND GATE & a NOT GATE produces a NAND GATE

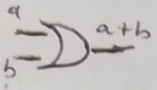


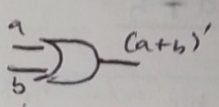
EQUAL TO



A NAND GATE

NOR Gate

OR 

NOR 

a	b	a+b
0	0	0
1	0	1
0	1	1
1	1	1

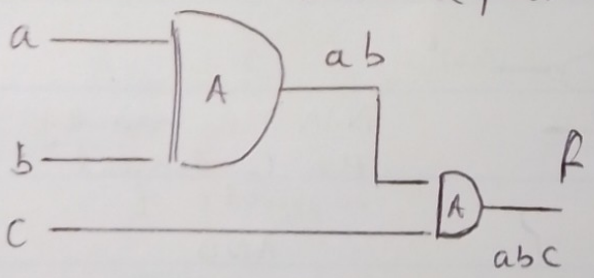
a	b	(a+b)'
0	0	1
1	0	0
0	1	0
1	1	0

NOTE

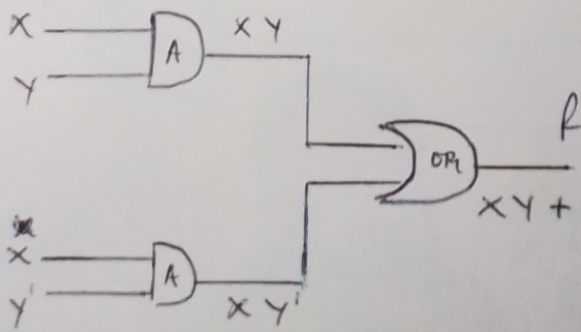
AND = multiplication
e.g  = ab

OR = Addition
e.g  = a+b

Question 1. Write a function using the block diagrams shown below

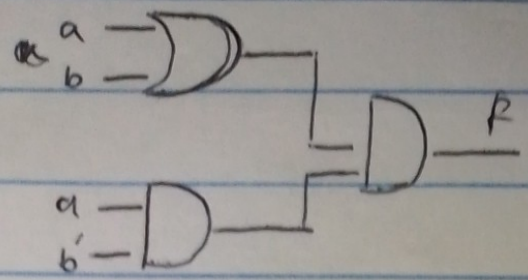


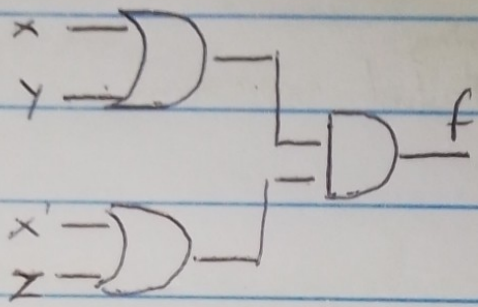
Ans: f = abc



Ans: f = xy + xy'

Exercise



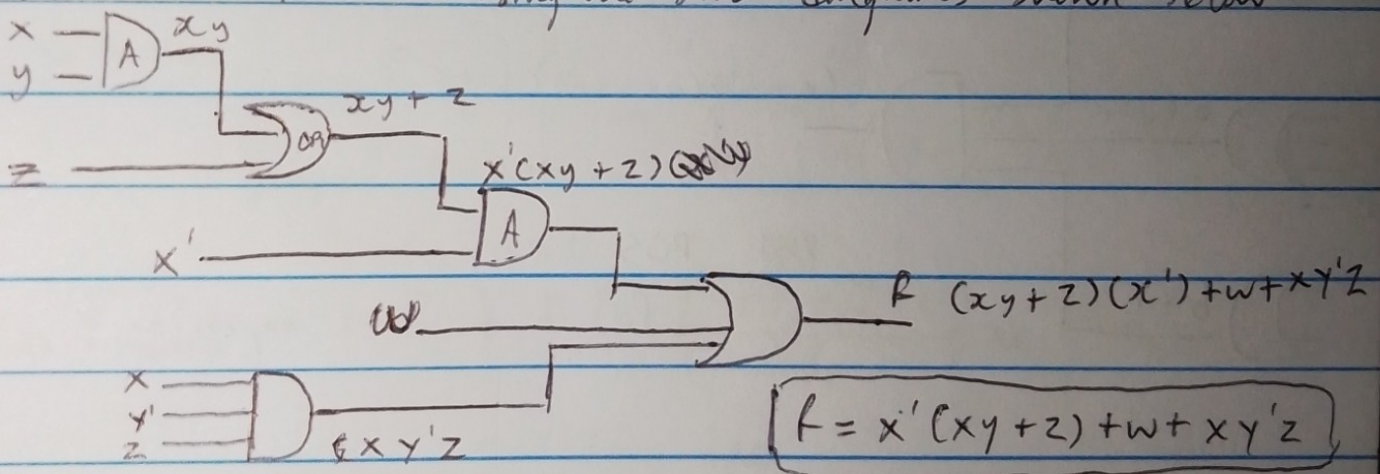


Don't forget

AND = × (multiplication)

OR = + (Addition)

2. Write a function using the block diagrams shown below:

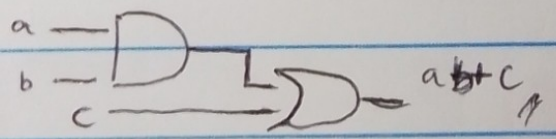


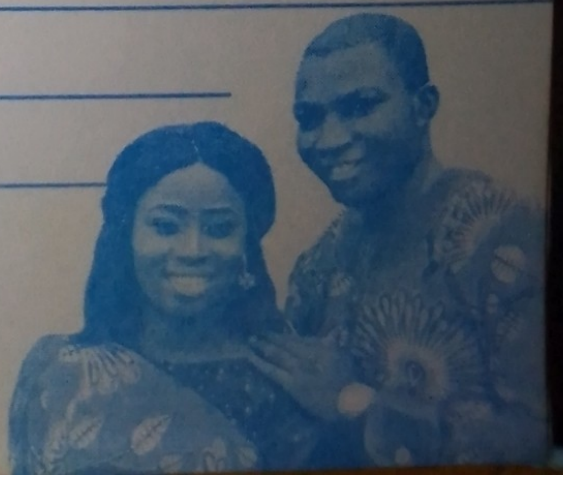
$f = x'(xy + z) + w + xy'z$

3. ~~Write~~ Draw a block diagram given the function below:

$f = ab + c$

AND OR

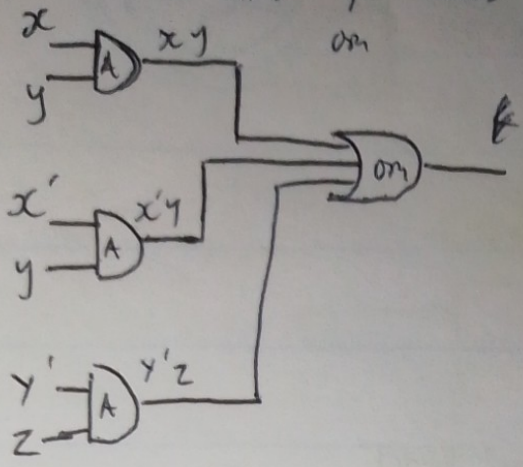




b. Draw a block diagram given the function below

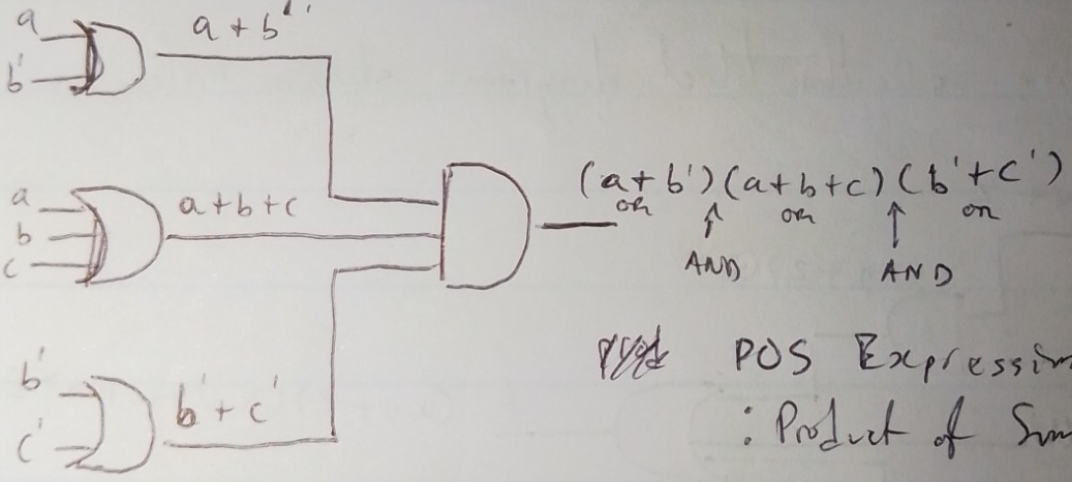
$$f = xy + x'y + y'z$$

(AND, OR, OR, AND)



SOP Expressing
: Sum Of Product expression

c. $f=(a+b')(a+b+c)(b'+c')$



POS Expressing
: Product of Sums expression