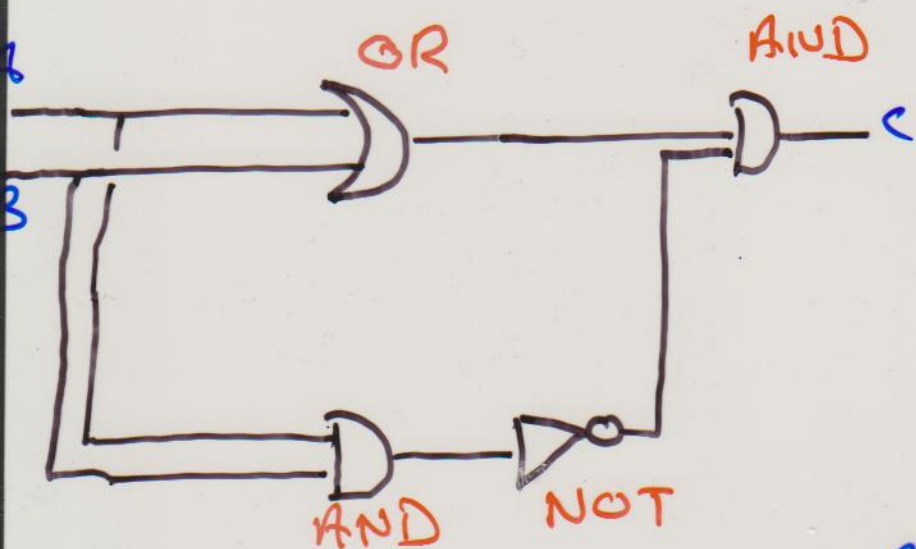
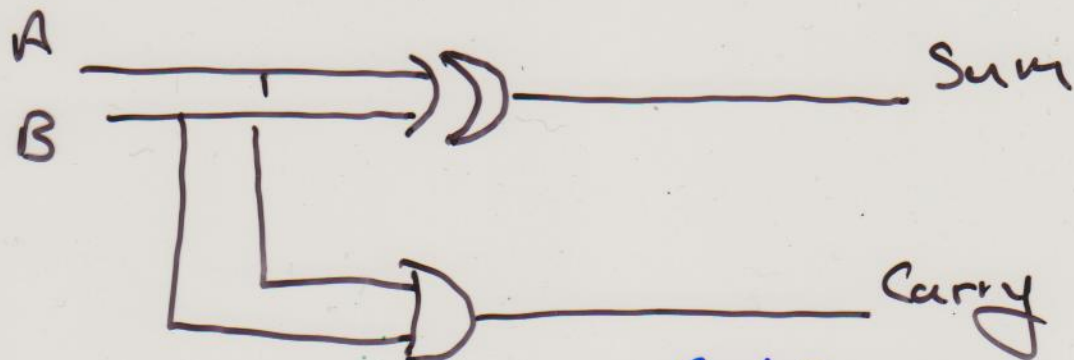


Summary of yesterday:



A	B	C
0	0	0
1	0	1
0	1	1
1	1	0

often write XOR as



A	B	Sum	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Today

Problem: You meet two people on an island.

A says: "Exactly one of us is lying"

B says: "At least one of us is telling the truth"

Question: who is telling the truth

Solution

Let p be the proposition that
"A is truthful"

Let q be the proposition that
"B is truthful"

Set $T=1$

$F=0$

p	q	statement A	statement B
T	T	F	T
T	F	T	T
F	T	T	T
F	F	F	F

Since only the fourth row of the table is consistent, it must be the case that both A and B are lying.

Problem You meet three people on an island.

A says: "Exactly one of us is telling the truth"

B says: "We are all lying"

C says: "The other two are lying"

Who is lying?

Let p be "A is truthful"

" q " "B is truthful"

" r " "C is truthful"

p	q	r	Statement A	Statement B	Statement C
T	T	T	T	T	T
T	T	F	T	T	F
T	T	T	T	F	T
T	T	F	T	F	F
T	F	T	F	T	T
T	F	F	F	T	F
T	F	T	F	F	T
T	F	F	F	F	F
F	T	T	T	T	T
F	T	F	T	T	F
F	T	T	T	F	T
F	T	F	T	F	F
F	F	T	F	T	T
F	F	F	F	T	F
F	F	T	F	F	T
F	F	F	F	F	F

Since only the fourth row of the table is consistent, we must have that

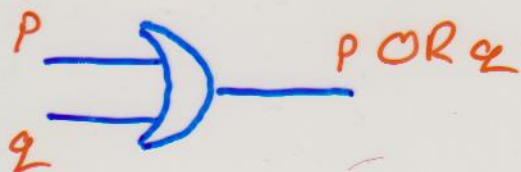
A is truthful

B, C are lying

Yesterday we met

P OR Q

and the corresponding symbol



Today: we'll write

$P \vee Q$ to mean "either proposition P is true, or proposition Q is true or both are true".

P	Q	$P \vee Q$
T	T	T
T	F	T
F	T	T
F	F	F

$P \wedge Q$ means "both P and Q are true".

P	Q	$P \wedge Q$
T	T	T
T	F	F
F	T	F
F	F	F

$\neg p$ means "not p " or
" p is false"

p	$\neg p$
T	F
F	T