

yesterday: the connective "OR" is defined by the truth table

P	Q	P OR Q
T	T	T
T	F	T
F	T	T
F	F	F

How about P AND Q ?

Graham is Welsh AND Cardiff is the capital of Ireland. **F**

Graham is Welsh AND Cardiff is the capital of Wales. **T**

The connective "AND" is defined by the following truth table.

P	Q	P AND Q
T	T	T
T	F	F
F	T	F
F	F	F

Compare AND to $f(x,y) = xy \pmod{2}$

x	y	$xy \pmod{2}$
1	1	1
1	0	0
0	1	0
0	0	0

Another useful connective is NOT.

This is defined by the truth table

P	NOT P
T	F
F	T

Q. What mod 2 function corresponds to NOT ?

A. $f(x) = x+1 \pmod{2}$

x	$x+1 \pmod{2}$
1	0
0	1

Handy notation

we write

$P \vee Q$ for P OR Q

$P \wedge Q$ for P AND Q

$\neg P$ for NOT P

You need to remember the above three boxed tables that define

\vee, \wedge, \neg .

We can use these connectives to build complicated logical expressions such as

$$(\neg P) \wedge Q \vee (P \wedge R)$$

Such an expression determines a truth table

P	Q	R	$(\neg P) \wedge Q$	$P \wedge R$	$(\neg P \wedge Q) \vee (P \wedge R)$
T	T	T	F	T	T
F	T	T	T	F	T
T	F	T	F	T	T
T	T	F	F	F	F
T	F	F	F	F	F
F	T	F	T	F	T
F	F	T	F	F	F
F	F	F	F	F	F