

More Truth Tables

AND		
A	B	$A \wedge B$
True	True	True
True	False	False
False	True	False
False	False	False

IMPLIES		
A	B	$A \Rightarrow B$
True	True	True
True	False	False
False	True	True
False	False	True

EQUIVALENCE		
A	B	$A \Leftrightarrow B$
True	True	True
True	False	False
False	True	False
False	False	True

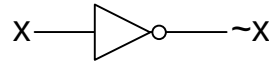
NOT	
A	$\sim A$
True	False
False	True

More Logic

Logic Circuits and Symbols

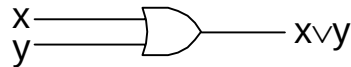
A *logic circuit* is sort of like an electrical diagram, which you can follow along by hand from one side to the other. There are three main symbols you need to know. They are often called 'gates'.

NOT symbol

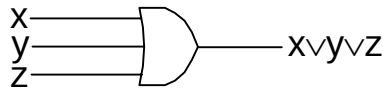


This looks like a triangle with a small circle at the tip. When you put a statement like 'x' into it, you come out with the opposite of that statement. So true becomes false, and false becomes true. Notice that there's only one input.

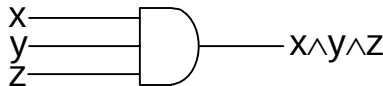
OR symbol



This is like a triangle but with *all* the sides curved. Also notice how it has *two* inputs. You can actually have more than two inputs as well, for instance, if you have x, y and z as inputs then it would look like this:



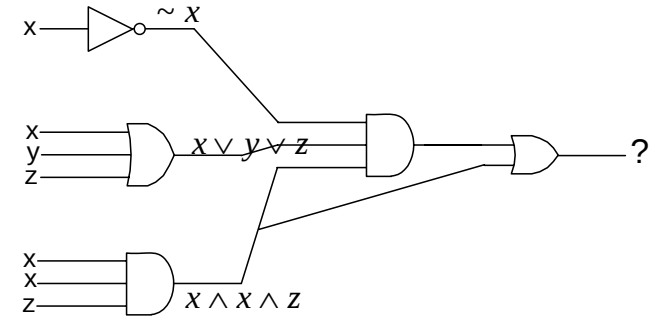
AND symbol



The AND symbol is like a bit of a rectangle with a semicircle attached to one end. It can also have more than 2 inputs, like in this particular case.

Analysing Logic Circuits

Work your way bit by bit through each part of the circuit:



Use letters first – keep 'x', 'y', and 'z' in the calculations.

Use brackets to keep each of the inputs separate in the expression for the output for the rightmost AND gate:

$$(\sim x) \wedge (x \vee y \vee z) \wedge (x \wedge x \wedge z)$$

Work through until you get a final expression:

$$[(\sim x) \wedge (x \vee y \vee z) \wedge (x \wedge x \wedge z)] \vee [x \wedge x \wedge z]$$

Evaluate by substituting in the values:

$$x = \text{true}, y = \text{false}, z = \text{true}$$

$$\Rightarrow [\text{false} \wedge \text{true} \wedge \text{true}] \vee [\text{true}]$$

$$= [\text{false}] \vee [\text{true}]$$

$$= \text{true}$$