

Classical logic:

Idea:

0 means “false”

1 means “true”

Operations:

$P$	$Q$	$P \& Q$	$P \vee Q$	$P \rightarrow Q$	$P \leftrightarrow Q$	$P$	$\neg P$
0	0	$0 \& 0 = 0$	$0 \vee 0 = 0$	$0 \rightarrow 0 = 1$	$0 \leftrightarrow 0 = 1$	0	$\neg 0 = 1$
0	1	$0 \& 1 = 0$	$0 \vee 1 = 1$	$0 \rightarrow 1 = 1$	$0 \leftrightarrow 1 = 0$	1	$\neg 1 = 0$
1	0	$1 \& 0 = 0$	$1 \vee 0 = 1$	$1 \rightarrow 0 = 0$	$1 \leftrightarrow 0 = 0$		
1	1	$1 \& 1 = 1$	$1 \vee 1 = 1$	$1 \rightarrow 1 = 1$	$1 \leftrightarrow 1 = 1$		

We will use a more compact form.

If  $P = 1$  and  $Q = 0$ , then

$$\underbrace{\underbrace{P}_{1} \rightarrow \underbrace{Q}_{0}}_0$$

So:

$P$	$Q$	$P \& Q$	$P \vee Q$	$P \rightarrow Q$	$P \leftrightarrow Q$	$P$	$\neg P$
0	0	0	0	1	1	0	1
0	1	0	1	1	0	1	0
1	0	0	1	0	0		
1	1	1	1	1	1		

Constants:

$\top = 1$

$\perp = 0$

Our first non-classical logic:

Idea:

00 means “false”

11 means “true”

01 is something intermediate between true and false

Operations:

$P$	$Q$	$P \& Q$	$P \vee Q$	$P \rightarrow Q$	$P \leftrightarrow Q$	$P$	$\neg P$
00	00	00	00	11	11	00	11
00	01	00	01	11	00	01	00
00	11	00	11	11	00	11	00
01	00	00	01	00	00		
01	01	01	01	11	11		
01	11	01	11	11	01		
11	00	00	11	00	00		
11	01	01	11	01	01		
11	11	11	11	11	11		

Constants:

$\top = 11$

$\perp = 00$