**XX. Boolean Calculus**

# Program Name: boolin.java Input File: boolin.dat

Boolean calculus is useful for network communication protocols or something. But other than that it’s pretty useless.

Here is some common boolean algebra notation with booleans x and y:

NOT -

AND -

OR -

XOR -

Consider boolean function f below:

The derivative of f is true if and only if a change in the value of x changes the value of f. Basically, the derivative is true if x is an “important” variable. This can be represented as such below:

For each test case, read in the boolean function, and for each provided boolean pair, print out the derivative of the function at that point.

**Input**

The first line of output will be an integer n, the number of test cases to follow. Each test case will then contain a boolean operator (as it would appear in Java) and an integer b, which is the number of boolean pairs to follow. The boolean operator will replace the “or” in the parent function listed above, so all functions will be in the format of “f(x,y) = x (some boolean operator) y”. Each boolean pair (x, y) will appear as “X Y” with their respective values. All boolean operators can be tested on.

Possible boolean operators -

* OR “||”
* AND “&&”
* XOR “^”
* EQUALS “==”
* NOT EQUALS “!=”

**Output**

The derivative at the point given

**Example Input File**

3

||

4

true true

true false

false true

false false

&&

4

true true

true false

false true

false false

**Example Output to Screen**

false

true

false

true

true

false

true

false