**XX. Boolean Calculus**

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

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

The common boolean algebra notation for NOT and XOR are listed below:

NOT -

XOR -

Consider boolean function f below, where "⭐︎" represents a boolean operator:

The derivative of f is defined as

For each test case, read in the boolean operator, 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 “⭐︎” 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