Problem A 資工的遊戲

問題描述

老湯發明了一個遊戲,他發明了以下規則。pop：刪除該陣列最後一元素，push：在陣列最後一個位置添加一元素，add：在任一位置新增一元素(不包含最後一個位置)，dele：在任一位置刪除一元素(不包含最後一個位置)。

老湯會給你預設的陣列元素，接下來給定數個陣列，求出該陣列是運用前個陣列的哪種規則得到的，你可以確定這個陣列的元素永不重複且長度永遠大於 2。

輸入說明

第一行為一行數字以空格隔開，為該題老湯出的原始題目。第二行為一整數 n，代表會有幾筆測試資料。接下來有 n 行，代表此陣列目前狀態。

輸出說明

首先一開始先輸出初始化陣列的所有元素，兩個數字間以"->"隔開。接下來一次一行，輸出此次陣列是由哪個規則得到的，請輸出哪種規則並輸出新增或是刪除了哪個元素，中間以空白隔開。

範例輸入一	範例輸出一
1 2 3 4 5 8 1 2 3 4 1 2 3 4 6 1 2 3 6 2 3 6 2 3 5 6 2 3 5 6 7 2 -1 3 5 6 7 -1 3 5 6 7	1->2->3->4->5 pop 5 push 6 dele 4 dele 1 add 5 push 7 add -1 dele 2

Problem B Keystroke

Problem Description

You are designing a numeric keypad for numbers 1 to 4, where each number is associated with a unique key. All of the keys are arranged as a 2 × 2 matrix, and there is a detection circuit beneath the keypad. When a key is pressed, the circuit will transmit the keystroke signals to the controller, which will receive its row number and column number. We can use a pair (row, column) to represent an event of a keystroke. Precisely speaking, when you press the key of number i where $i \in \{1, 2, 3, 4\}$, the controller will receive the pair $(\lfloor (i-1)/2 \rfloor, (i-1) \bmod 2)$. For example, when you press key 3, the controller gets (1, 0) as the keystroke signal. You would like to press several keys at the same time for some reason. When you do this, the controller can still receive their corresponding row/column numbers. However, their row numbers are mixed together, as well as the column numbers. For example, when you press keys 1 and 4 simultaneously, the controller would get row numbers {0, 1} and column numbers {0, 1}, because key 1 emits (0, 0) and key 4 emits (1, 1). Another example is that when you pressed keys 1 and 2 simultaneously, the controller can only receive ({0}, {0, 1}) because key 1 emits (0, 0) and key 2 emits (0, 1) and their row numbers are the same. Notice that different keystroke combinations may lead to the same signal. Press keys 2 and 3 would get ({0, 1}, {0, 1}) which is identical to press 1 and 4. Press keys 1, 2, 3, 4 simultaneously would get the same result. Given a keystroke signal, which is in the (row, column)-paired form, please write a program to identify the total number of possible keystroke combinations that can lead to this signal.

Input Format

The first line of the input is a positive integer that specifies the number of test cases. Each test case follows immediately in the next line after the previous one. In each test case, its first line gives you two positive integers m and n. Its second line gives you m distinct integers that are the received row numbers. Its third line gives you n distinct integers that are the received column numbers. All numbers in the same line are space-delimited.

Output Format

Output the result in a single line for each test case.

Technical Specification

- There are at most 10 test cases.
- $1 \le m, n \le 2$.

Sample Input 1	Sample Output 1
2 2 1 0 1 0 1 2 1 0 1	1 1

Problem C 資工的美德

問題描述

我們看到單字 localization 或 internationalization 這些長度超過 10 字元的單字。

而現在老湯老師很懶惰，他現在認定單字長度為十以上的都*太長*了，他想做一些改變，而規則是：留下字首跟字尾並在中間寫下字首與字尾間包含了幾個字元。

因此 localization 應改為 l10n，internationalization 應改成 i18n。

現在，請你寫一隻程式協助老湯能自動轉換成他的要求。並記住他認為不是*太長*的單字不用更動。

輸入說明

第一行為一數字 n，n<=5，代表有幾個單字。接下來有 n 行，每一行皆為一個單字。

輸出說明

依照老湯的規則轉換，一次一行輸出一個答案。

範例輸入一	範例輸出一
1 localization	l10n

Problem D 資工的課程

問題描述

小資同學最近在學三種邏輯運算子 AND、OR 和 XOR。這三種運算子都是二元運算子，也就是說在運算時需要兩個運算元，例如 a AND b。 對於整數 a 與 b，以下三個二元運算子的運算結果定義如下列三個表格：

AND	a >= 0	a < 0
b >= 0	1	0
b < 0	0	1

OR	a >= 0	a < 0
b >= 0	1	0
b < 0	0	1

XOR	a >= 0	a < 0
b >= 0	0	0
b < 0	1	0

(1) 0 AND 0 的結果為 1，0 OR 0 的結果為 1，0 XOR 0 的結果為 0。
(2) 0 AND -1 的結果為 0，0 OR -1 的結果為 0，0 XOR -1 的結果則為 1。

請撰寫一個程式，讀入 a、b 以及邏輯運算的結果 result，輸出 可能的邏輯運算為何。

輸入說明

輸入只有三行，每一行皆為一整數，依序為整數 a，整數 b，邏輯 運算的結果，|a|<=100，|b|<=100，邏輯運算的結果保證為 0 或 1。

輸出說明

輸出可能得到指定結果的運算，若有多個，輸出順序為“AND”、“OR”、“XOR”，每個可能的運算單獨輸出一行，每行結尾皆有換行。若不可能得到指定結果，輸出“IMPOSSIBLE”。 （注意輸出時所有英文字母均為大寫字母。）

範例輸入一	範例輸出一
1 1 1	AND OR

範例輸入二	範例輸出二
0 0 0	XOR

Problem E Right-Coupled Numbers

Problem Description

An integer x is said to be a right-coupled number, if you can find two integers, say $0 < a \le b \le x$ such that $a \times b = x$ and $a/b \ge 0.5$. In this problem, your task is to determine whether a given integer is a right-coupled number or not.

Input Format

The first line of the input is an integer N denoting the number of test cases. Each test case is in one line, which contains a single integer $0 < x < 2^{15}$.

Output Format

If the given integer x is a right-coupled number, output 1; otherwise, output 0. Each is in a single line.

Technical Specification

- $1 \le N \le 1000$
- $0 < x < 2^{15}$

Sample Input 1	Sample Output 1
4 66 55 105 150	1 0 0 1