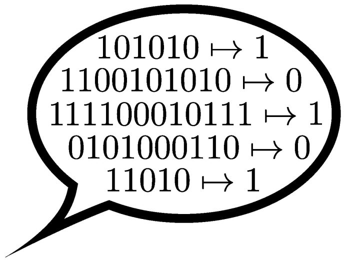
B Binary Speakers

Time limit: 2s



The inhabitants of planet Post communicate using functions $f\colon \{0,1\}^k \to \{0,1\}$ ($k \geq 1$) in a similar way as we use words. People learn how to communicate by memorizing a few basic functions and ways of combining them to form more complex ones. Their language is the collection of all binary functions they can express in this way. A person only understands another if she knows all the functions the other knows.

Different regions of this planet teach their inhabitants the same combination mechanisms but possibly different basic functions, so that it is not guaranteed that people from different regions understand each other.

Since the year 1111110011, the global government of planet Post, in an effort to improve communication among regions, established that every region has to teach their inhabitants at least the following functions:

- the *projections* $\pi_k^i\colon \{0,1\}^k \to \{0,1\}$, such that $\pi_k^i(a_1,\ldots,a_k) := a_i$, for all $1 \leq i \leq k$ and all $k \geq 1$; and
- the function $s\colon \{0,1\}^3 \to \{0,1\}$ given by the following table that relates all possible inputs (a,b,c) to the output $s(a,b,c)$:

a	b	c	$s(a,b,c)$
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

The combination mechanism is *superposition*, meaning that we can form a new function h of n arguments from known functions f (of m arguments) and m functions g_i of n arguments such that for all $a_1,\ldots,a_n \in \{0,1\}$:

$$h(a_1,\ldots,a_n) := f(g_1(a_1,\ldots,a_n),\ldots,g_m(a_1,\ldots,a_n))$$

Mister Bin inhabits a region that only teaches these minimum language features, that is, only the above-defined functions can be combined via superposition.

See some examples of binary functions, named h_1, h_2 and h_3, that Mister Bin understands:

a	b	$h_1(a,b)$	$h_2(a,b)$	$h_3(a,b)$
0	0	0	0	0
0	1	1	0	1
1	0	1	0	0
1	1	1	1	1

Given the set of basic functions beyond the minimum required taught in a region R of planet Post, tell whether Mister Bin fully understands the individuals from R or not. When it is possible, you have to provide expressions in Mister Bin's language corresponding to the basic functions taught in R.

Input

The input consists of:

- One line with an integer N ($1 \leq N \leq 10$), the number of basic functions beyond the minimum taught in region R.
- N groups of lines, each specifying one of these functions as follows:
  - One line with two integers k and z ($1 \leq k \leq 10$, $0 \leq z \leq 2^k$), the number of arguments the function accepts and the number of inputs for which the function outputs 0.
  - z lines, each with k integers $a_1, \ldots, a_k$, denoting a k-tuple $(a_1, \ldots, a_k) \in \{0,1\}^k$ for which the function outputs 0.

Output

For each of the N specified functions $f\colon \{0,1\}^k \to \{0,1\}$, output a line having one of the following forms:

- `no`, if the function is not understood by Mister Bin; otherwise
- `yes,<expr>` , where `<expr>` is f written as a superposition of the basic functions taught to Mister Bin. This string has one of the following forms:
  - `pi`n`(x)`, for $1 \leq n \leq k$ (here `x` represents a k-tuple, since the projections receive k arguments); and
  - `s(`$F1$`,`$F2$`,`$F3$`)`, where $F1$, $F2$ and $F3$ are strings formed in this same way.

The output must have at most 10^7 characters.

Sample Input 1	Sample Output 1
1 1 1 0	yes,pi1(x)

Sample Input 2

```
2
2 2
0 1
1 0
2 1
0 0
```

Sample Output 2

```
no
yes,s(pi2(x),pi2(x),pi1(x))
```