

## Assembly Required

**Program Name:** assembly.java

**Input File:** assembly.in

You just purchased a brand new desk, but the problem is that it's in pieces and requires assembly. You begin by removing all of the hardware, most of which consists of several sets of screws of different sizes. You read through the instruction manual to find that each step refers to the required screw by its size. The problem is that you have no idea of knowing the size of the screws since they are not labeled (and you don't have a ruler).

You come up with a clever idea that involves comparing the screws based on their size (you put screws next to each other to determine which is longer). This allows you to arrive at an ordering of screws from longest to shortest. Since you know the expected sizes, you can then determine which screws are which length and, correspondingly, which screws need to be used for the current step. This process turns out to be tedious, so you decide to write a program to figure it all out for you.

Note that different types of screws are always different lengths.

### Input

The first line will contain a single integer  $n$  indicating the number of data sets.

The first line of each dataset will contain a single integer  $m < 10$  indicating the number of sets of screws, which are labeled as 'A', 'B', 'C', etc.

Each of the next  $m$  lines form a matrix, like a multiplication table, relating the sizes of screws. The first line compares set 'A' to each of the other sets using the characters '<', '>', and '=' to indicate that its length is less than, greater than, or equal to the length of screws in the corresponding column. The next line holds the same information for set 'B', and the pattern continues for each of the other types of screws. Note that since all screw types are of different sizes, the '=' will only appear along the main diagonal of the matrix.

The next line in each dataset will list the screw lengths, in descending order, as they are listed in the manual.

The last line in each dataset will consist of an integer that corresponds to the length of the screw required for the next step.

### Output

For each dataset, display the string "SET  $X$ " where  $X$  is the character label of the set where you get the next required screw.

### Example Input File

```
2
5
= > > > >
< = > > >
< < = > >
< < < = >
< < < < =
5 4 3 2 1
1
3
= > <
< = <
> > =
15 5 1
5
```

### Example Output To Screen

```
SET E
SET A
```