Hasso Plattner Institut
IT Systems Engineering | Universität Potsdam

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Sommersemester 2017

Woche 08 – (Adv.) Competitive Programming

Abgabe 12.06.2017 17:00 Uhr, über das Judge-Interface

Aufgabe 1 (stubbornstudents)**.** (100 Points – 15 seconds timelimit)

Your old school, knowing that your are studying at world-renowned Hasso Plattner Institute, has asked for your help: A few weeks ago groups of students started to band together to cause chaos and mischief. To restore some order by separating the different groups, the principal wants to know who belongs to which group, however the students stubbornly refuse to tell. The only information the teachers can get out of them is whether two students belong to the same group or not.

Since the principal is not very good at logic puzzles, he has asked you to come in and identify the important groups. A group is considered important if more than one third of the students are members (every student belongs to exactly one group (which may consist of just themselves)).

You cannot ask too many questions, or the students will catch onto what is going on.

This problem apparently affects multiple schools, and you have been asked to help all of them.

Input/Output First read one line containing n, the number of schools at which you have to solve the problem. Then, for each school, read one line containing k ($0 < k \leq 8000$), the number of students at the school.

You may then ask the teachers to determine if two students `$a` and `$b` ($0 \leq a, b < k$) belong to the same group or not, by printing a line `q $a $b` where `q` is the literal character "q". You may ask at most 32k questions before reading the responses. For each question, you will receive a one line reply containing either `y` (yes, they belong to the same group) or `n` (no, they do not belong to the same group).

Once you have finished you investigation, print one line `r $s0 $s1 $s2 ... $sn`, where `$s0` to `$sn` are representative members of the important groups (that is, for each important group, include exactly one member in that list).

Points There are three groups of test sets:

- *easy:* For the first group worth 25 Points, you can assume, that $k \leq 10$.
- *medium:* For the second group worth 35 Points, you can assume, that $k \leq 100$.
- *hard:* For the third group of test sets worth 40 Points, there are no additional assumptions.

Sample Consider the following assignment from groups to students (which your program of course doesn't has access to):
`GroupA = {0, 2, 4}, GroupB = {1, 3, 5}, GroupC = {6, 7}`
Your program would initially receive the following input:

```
1
8
```

It would then be expected to ask some questions, for example:

```
q 0 0
q 0 2
q 0 1
q 1 6
```

And would receive the following answers:

```
y
y
n
n
```

At last, your program would reply with one member from each of the two important groups (which are `GroupA` and `GroupB`):

```
r 0 1
// some alternative solutions (there are more):
r 1 0
r 2 5
r 3 4
```