

50,000 Sauces

Chef Donghyun Kim prides himself on being able to make 50,000 kinds of sauces. Is that really true? You become a judge for a cooking competition and try to measure Chef Donghyun Kim's sauce-making ability.

There are N ingredients in the competition venue. Each ingredient is numbered $0, 1, \dots, N - 1$. The sauces Chef Donghyun Kim can make are composed of either 2 or 3 of these ingredients. For any two different sauces, the list of ingredients composing the two sauces cannot be exactly the same (although some ingredients may overlap).

Mathematically, the sauces Chef Donghyun Kim can make are elements of a set X . Each element S forming X is a subset of $\{0, 1, \dots, N - 1\}$, and $|S|$ is 2 or 3. Following general definition, a set cannot contain duplicate elements.

As a judge, you need to find out the total number of sauces Chef Donghyun Kim can make, $|X|$. You are not given information about X directly, but you can obtain information about it through a **blind test**.

The blind test proceeds as follows:

- You can choose a subset Y of the ingredients $\{0, 1, \dots, N - 1\}$ and put them in a pot to give to the chef. However, the size of the pot is limited, so the number of ingredients you can put in at once cannot exceed $\lceil \frac{N}{2} \rceil + 1$. That is, it must satisfy $|Y| \leq \lceil \frac{N}{2} \rceil + 1$. Here, $\lceil t \rceil$ denotes the smallest integer greater than or equal to the real number t .
- Chef Donghyun Kim tells you the total number of sauces he can make using only the ingredients inside the pot Y . That is, $f(Y) = |\{S \in X \mid S \subseteq Y\}|$ is returned to you.

Your goal is to determine $|X|$ exactly with a small number of blind tests.

Implementation Details

You must implement the following function:

```
int solve(int N)
```

- N : The number of ingredients.
- This function must return $|X|$.
- This function is called exactly once.

This function can call the following function:

```
int query(vector<int> Y)
```

- Each element of Y represents an ingredient number.
- Each element of Y must be distinct.
- It must satisfy $0 \leq Y[i] \leq N - 1$ ($0 \leq i \leq |Y| - 1$).
- It must satisfy $|Y| \leq \lceil \frac{N}{2} \rceil + 1$.
- This function returns $f(Y) = |\{S \in X \mid S \subseteq Y\}|$.
- This function can be called at most 3 000 times in one test case.

Constraints

- $6 \leq N \leq 1\,000$
- $1 \leq |X| \leq 50\,000$
- For all $S \in X$, $|S| \in \{2, 3\}$
- The grader in this problem is not adaptive. This means the set X is fixed before `solve` is called.

Subtasks

Number	Points	Constraints
1	11	$N \leq 500$, for any two distinct elements S_i, S_j of X , $S_i \cap S_j = \emptyset$, for all $S \in X$, $ S = 2$
2	32	$N \leq 500$, for any two distinct elements S_i, S_j of X , $S_i \cap S_j = \emptyset$
3	25	For all $S \in X$, $ S = 2$
4	32	No additional constraints.

Scoring

In each subtask, if your program fails to return $|X|$ correctly even once, you get 0 points for that subtask.

If you correctly return $|X|$ for all test cases in a specific subtask, the score for that subtask is calculated according to the following rules. Let Q be the maximum number of queries (`query` calls) used in the test cases included in each subtask.

Subtasks 1, 2

In Subtasks 1 and 2, if $Q \leq 3\,000$, you get 100% of the subtask score.

Subtasks 3, 4

The score obtained in Subtasks 3 and 4 is calculated as follows:

- If $41 < Q \leq 3\,000$, you get the subtask score multiplied by the following ratio:

$$0.5 + \frac{41}{2Q}$$

- If $Q \leq 41$, you get 100% of the subtask score.

Examples

$N = 6$, and the sauces Chef Donghyun Kim can make are $X = \{\{0, 1\}, \{2, 3, 4\}\}$. $|X| = 2$.

The maximum size of the pot is $\lceil \frac{6}{2} \rceil + 1 = 4$.

The grader initially calls the following function:

```
solve(6)
```

The participant's code may interact as follows:

```
query({0, 1, 2})
query({2, 3, 4})
query({0, 2, 3, 5})
```

- Since $\{0, 1\} \subseteq \{0, 1, 2\}$ and $\{2, 3, 4\} \not\subseteq \{0, 1, 2\}$, `query({0, 1, 2})` returns 1.
- Since $\{0, 1\} \not\subseteq \{2, 3, 4\}$ and $\{2, 3, 4\} \subseteq \{2, 3, 4\}$, `query({2, 3, 4})` returns 1.
- Since $\{0, 2, 3, 5\}$ does not contain any element of X , `query({0, 2, 3, 5})` returns 0.

The participant's code submits the answer by returning 2 as the return value of `solve(6)`.

Sample Grader

The input format for the sample grader is as follows:

- line 1: N
- line 2: K ($= |X|$)
- For every $0 \leq i < K$:
 - line $3 + i$: $L a_0 a_1 \cdots a_{L-1}$
 - $2 \leq L \leq 3$
 - $0 \leq a_j \leq N - 1$
 - a_0, a_1, \dots, a_{L-1} are distinct.
 - $\{a_0, a_1, \dots, a_{L-1}\}$ is an element of set X .

The sample grader outputs the value returned by your code in the `solve` function and the number of times `query` was called in the following format:

- line 1: The value x returned by the `solve` function
- line 2: The number of times `query` was called, Q