

# Set Cover

In the set cover problem there is a collection  $C = \{S_1, \dots, S_m\}$  of subsets of the universe  $[n] = \{0, \dots, n-1\}$ , and one must find a minimum-sized subcollection of  $C$  that still covers  $[n]$  (it may be the case that  $S_i$  and  $S_j$  contain the exact same elements for some  $i \neq j$ ). A **path of length  $r$**  is a graph on  $r+1$  vertices  $v_0, \dots, v_r$  where  $v_i$  has an undirected edge to  $v_{i+1}$  for  $i = 0, \dots, r-1$  (these are the only edges). A set cover instance  $I$  is said to be **path-realizable** if there exists a mapping from  $I$  to a path of length  $m$  where the  $S_i$  are mapped to edges in the path and each  $i$  in  $[n]$  is mapped to a pair of (not-necessarily distinct) vertices  $s_i, t_i$  on the path such that the edges lying between  $s_i$  and  $t_i$  correspond exactly to the sets of  $C$  that contain  $i$ . Two sets  $S_i, S_j$  must be mapped to different edges on the path if  $i \neq j$ . You will be given a set cover instance that is guaranteed to be path-realizable and should output the size of a minimum-sized subcollection of  $C$  still covering  $[n]$ .

## Input

The first line of the input is " $N M$ " ( $1 \leq N, M \leq 300$ ), where  $N$  is the size of the universe and  $M$  is the number of sets  $S_i$  in the collection of subsets of  $\{0, \dots, N-1\}$ . What follows are  $M$  groups of lines. The  $i$ th group starts with one line containing  $|S_i|$ , the size of the  $i$ th subset. If  $|S_i| = 0$ , the current group of lines ends. Otherwise the next line is a space-separated list of the elements contained in  $S_i$ .

## Output

If  $[n]$  cannot be covered by a subcollection of  $C$  then you should output  $-1$ , followed by a newline. Otherwise, your output should consist of two lines. The first line is the size of a minimum-sized set cover. The second line is a space-separated list of the 0-based indices of the sets in an optimal set cover.

## Example

### Input:

```
3 4
0
2
2 1
2
1 0
0
```

### Output:

```
2
1 2
```