

Problem J. Joining Powers

Input file: *standard input*
Output file: *standard output*
Time limit: 2 seconds
Memory limit: 256 mebibytes

Consider the set of infinite sequences:

- sequence #1, named $S(1)$, is $1, 2, 3, \dots, n, \dots$;
- sequence #2, named $S(2)$, is $1, 4, 9, \dots, n^2, \dots$;
- sequence #3, named $S(3)$, is $1, 8, 27, \dots, n^3, \dots$;
- and so on;
- sequence # k , named $S(k)$, is $1, 2^k, 3^k, \dots, n^k, \dots$;
- and so on;

Obviously, each of these sequences is monotonically increasing.

We say that sequence $S(i_1, i_2, \dots, i_m)$ is a union of sequences $S(i_1), S(i_2), \dots, S(i_m)$ if:

- each element of each sequence $S(i_1), S(i_2), \dots, S(i_m)$ belongs to $S(i_1, i_2, \dots, i_m)$;
- each element, that belongs to several sequences $S(i_1), S(i_2), \dots, S(i_m)$, belongs to $S(i_1, i_2, \dots, i_m)$ exactly once;
- sequence $S(i_1, i_2, \dots, i_m)$ is monotonically increasing.

For example, $S(2, 3, 5)$ is $1, 4, 8, 9, 16, 25, 27, 32, 36, 49, 64, 81, 100, 121, 125, \dots$

Your task is to write a program which will process a series of queries in the form "find the N -th element of $S(i_1, i_2, \dots, i_m)$ ", where $N, m, i_1, i_2, \dots, i_m$ are input data.

Input

The first line of the input contains single integer — quantity of queries q ($1 \leq q \leq 987$). Afterwards, input data contain exactly q queries. Each query takes two lines. The first line of each query contains N and m , where N ($1 \leq N \leq 10^9$) is the index (1-based) of the element to be determined, and m ($1 \leq m \leq 42$) is the quantity of sequences to be united. The second line of each query contains integers $i_1, i_2, \dots, i_m$ (all different, all in range $1 \leq i_k \leq 50$).

Output

The program should output results for all queries, each in a separate line. It's guaranteed that answer does not exceed 10^{17} .

Example

standard input	standard output
2	81
12 3	38416
2 3 5	
17 2	
4 7	