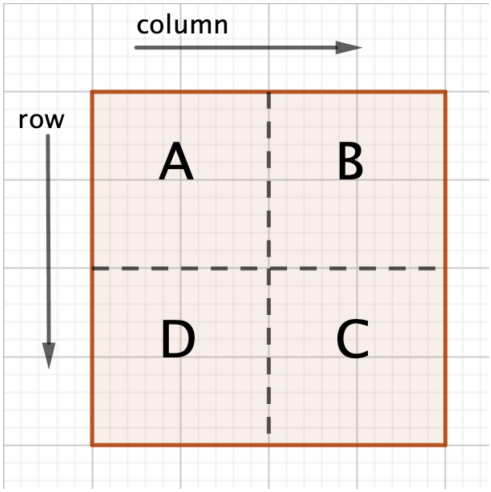
Problem A.

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Cows are addicted to Assassin's Creed, they start to mock the Leap of Faith - jumping from Farmer John's aircraft and landing in the haystack in front of their barn! Because cows are big fan of `Game of Thrones`, such behavior is also called Cow's Landing.



The farm is in a 2^n by 2^n grid map, row increases from top to bottom, column increases from left to right, and each of cows lives in different barn in a single cell. One day, cows decide to play Cow's Landing in a special order:

- They divided a 2^k by 2^k grid map into four parts (see the figure above):
  - `A`: $row \in [1, 2^{k-1}]$, $column \in [1, 2^{k-1})$;
  - `B`: $row \in [1, 2^{k-1}]$, $column \in (2^{k-1}, 2^k]$;
  - `C`: $row \in (2^{k-1}, 2^k]$, $column \in (2^{k-1}, 2^k]$;
  - `D`: $row \in (2^{k-1}, 2^k]$, $column \in [1, 2^{k-1}]$;
- All cows live in `A` jump first, then `B`, `C` and `D`;
- Cows in the smaller region x ($x \in \{A, B, C, D\}$) will apply same ordering recursively.

For example, if $n = 2$, the total order is:

1	2	5	6
4	3	8	7
13	14	9	10
16	15	12	11

Farmer John very cares about his employees, he has prepared m first-aid kits. Give the rank of a cow in the order, Farmer John needs to know the location of such cow.

Input

The first line contains one integer n ($1 \le n \le 9$), indicates the size of farm is 2^n by 2^n.

The second line contains one integer m ($1 \le m \le min(2^{2*n}, 1000)$), the number of queries. In the following m line, the ith line contains one integer a_i, the query for the a_ith cow.

Output

Print m lines, the ith line contains two integers row_i $column_i$, the location of the a_ith cow.