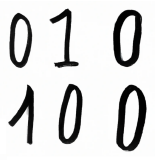
Task Diskurs



You are given n non negative integers $a_1, a_2, \ldots, a_n$ less than 2^m. For each of them you are to find the maximum possible *hamming distance* between it and some other element of the array a.

The hamming distance of two non negative integers is defined as the number of positions in the binary representation of these numbers in which they differ (we add leading zeros if necessary).

Formally, for each i calculate:

$$\max_{1 \leq j \leq n} hamming(a_i, a_j)$$

Input

The first line contains two integers n and m ($1 \leq n \leq 2^m, 1 \leq m \leq 20$).

The second line contains n numbers a_i ($0 \leq a_i < 2^m$).

Output

Output n numbers seperated with spaces, where the i-th number is the maximum *hamming distance* between a_i and some other number in a.

Scoring

Subtask	Points	Constraints
1	20	$m \leq 10$
2	25	$m \leq 16$
3	25	No additional constraints.

Examples

input	input	input
4 4 9 12 9 11	4 4 5 7 3 9	4 4 3 4 6 10
output	**output**	**output**
2 3 2 3	2 3 2 3	3 3 2 3

Clarification of the third example:
The numbers $3, 4, 6, 10$ can be represented as $0011, 0100, 0110, 1010$, in binary. Numbers 3 and 4 differ at 3 places, same as numbers 4 and 10. On the other hand, the number 6 differs in at most 2 places with all other numbers.