LIS

Alec Sdima is preparing a problem for Stelele Informaticii. He would like to construct a permutation with a very specific number of longest increasing subsequences.

A permutation of length N is a sequence $P[0], \ldots, P[N-1]$ in which every integer from 1 to N appears exactly once.

A subsequence of P is a sequence $P[i_0], P[i_1], \ldots, P[i_{k-1}]$, where $0 \leq i_0 < i_1 < \ldots < i_{k-1} < N$.

A subsequence is increasing if $P[i_0] < P[i_1] < \ldots < P[i_{k-1}]$. A longest increasing subsequence (LIS) is an increasing subsequence having maximum possible length.

Alec chooses a positive integer K. Your task is to construct a permutation that has exactly K distinct longest increasing subsequences. Two longest increasing subsequences are considered distinct if they use different sets of indices. The length of the permutation you construct must not exceed $100\,000$.

Input

The first line contains an integer T, the number of test cases.

Each of the next T lines contains an integer K, the required number of longest increasing subsequences.

Output

For each test case, output two lines.

The first line should contain an integer N, the length of the constructed permutation.

The second line should contain a permutation $P_0, P_1, \ldots, P_{N-1}$ of the integers from 1 through N.

Example

Input	Output
3 1 4 6	1 1 4 2 1 4 3 5 2 1 5 4 3

For the third test case, consider the permutation $[2, 1, 5, 4, 3]$.

The six longest increasing subsequences are

$$[2, 5], \quad [2, 4], \quad [2, 3], \quad [1, 5], \quad [1, 4], \quad [1, 3].$$

Constraints and Scoring

- $T \leq 10$
- $1 \leq K \leq 10^{18}$

Subtask	Score	Additional Constraints
1	10	K is a power of two
2	30	$1 \leq K \leq 10^5$
3	60	$1 \leq K \leq 10^{18}$

If the outputted sequence doesn't have exactly K Longest Increasing Subsequences, or the length of the sequence is greater than 10^5, your score will be 0.

Subtask 1 (10 points)

You will receive 10 points if the length of your sequence is at most 120, and 0 points otherwise.

Subtask 2 (30 points)

Let L denote the length of your sequence.

If $L \leq 41$, you will receive full score. The fraction of points you receive for this subtask is determined by the following formula:

$$\frac{1}{1+\left(\frac{\max\left(0,\log_2\left(\frac{L}{41}\right)\right)}{8}\right)^{5/4}}$$

Subtask 3 (60 points)

Let L denote the length of your sequence, and define

$$x = \log_2\left(\frac{L}{148}\right).$$

If $L \leq 148$, you will receive full score. Otherwise, the fraction of points you receive for this subtask is determined by the following formula:

$$\frac{1}{1+\frac{2x}{5x+1}+\left(\frac{x}{6}\right)^2}$$