

## C. Alya and Permutation

time limit per test: 2 seconds  
memory limit per test: 256 megabytes

Alya has been given a hard problem. Unfortunately, she is too busy running for student council. Please solve this problem for her.

Given an integer  $n$ , construct a permutation  $p$  of integers  $1, 2, \dots, n$  that maximizes the value of  $k$  (which is initially 0) after the following process.

Perform  $n$  operations, on the  $i$ -th operation ( $i = 1, 2, \dots, n$ ),

- If  $i$  is odd,  $k = k \& p_i$ , where  $\&$  denotes the [bitwise AND operation](#).
- If  $i$  is even,  $k = k | p_i$ , where  $|$  denotes the [bitwise OR operation](#).

### Input

The first line contains a single integer  $t$  ( $1 \leq t \leq 500$ ) — the number of test cases.

The only line of each test case contains a single integer  $n$  ( $5 \leq n \leq 2 \cdot 10^5$ ) — the length of the permutation.

It is guaranteed that the sum of  $n$  over all test cases does not exceed  $2 \cdot 10^5$ .

### Output

For each test case, output the maximum value of  $k$  in the first line and output the permutation  $p_1, p_2, \dots, p_n$  in the second line.

If there are multiple such permutations, output any.

### Example

input	Copy
6	
5	
6	
7	
8	
9	
10	

  

output	Copy
5	
2 1 3 4 5	
7	
1 2 4 6 5 3	
7	
2 4 5 1 3 6 7	
15	
2 4 5 1 3 6 7 8	
9	
2 4 5 6 7 1 3 8 9	
15	
1 2 3 4 5 6 8 10 9 7	

### Note

For the first test case, the value of  $k$  is determined as follows:

$k = 0$  initially.

- On the 1st operation, 1 is odd, so Alya sets  $k$  to be  $k \& p_1 = 0 \& 2 = 0$ .
- On the 2nd operation, 2 is even, so Alya sets  $k$  to be  $k | p_2 = 0 | 1 = 1$ .
- On the 3rd operation, 3 is odd, so Alya sets  $k$  to be  $k \& p_3 = 1 \& 3 = 1$ .
- On the 4th operation, 4 is even, so Alya sets  $k$  to be  $k | p_4 = 1 | 4 = 5$ .
- On the 5th operation, 5 is odd, so Alya sets  $k$  to be  $k \& p_5 = 5 \& 5 = 5$ .

The final value of  $k$  is 5. It can be shown that the final value of  $k$  is at most 5 for all permutations of length 5. Another valid output is  $[2, 3, 1, 4, 5]$ .

For the second test case, the final value of  $k$  is 7. It can be shown that the final value of  $k$  is at most 7 for all permutations of length 6. Other valid outputs include  $[2, 4, 1, 6, 3, 5]$  and  $[5, 2, 6, 1, 3, 4]$ .