Given N and K, find the lexicographically K-th (1-indexed) smallest permutation P_1, P_2, ..., P_N of the first N positive integers $(1, 2, \ldots, N)$, such that the adjacent numbers are relatively prime [$\gcd(P_i, P_{i+1}) = 1$, for $1 \leq i < N$] in the permutation. A permutation of N numbers A_1, A_2, ..., A_N is lexicographically smaller than another permutation B_1, B_2, ..., B_N if $A_i < B_i$ for some i and $A_j = B_j$ for all $j < i$.

Input

First line of the input contains an integer T (≤ 20), which is the number of test cases. Each of the next T lines contain two space separated integers N ($1 \leq N \leq 28$) and K ($1 \leq K \leq 10^{18}$).

Output

For each test case output the case number and then N space separated integers which is the lexicographically K-th smallest permutation of the first N positive integer numbers, such that adjacent numbers in the permutation are relatively prime. If there are less than K such permutations then output '`-1`'.

See sample input output for exact formatting.

Sample Input

```
3
3 3
4 2
4 20
```

Sample Output

```
Case 1: 2 1 3
Case 2: 1 4 3 2
Case 3: -1
```