Problem C. Cheater Changes Costs

Time limit: 2 seconds

There are n students who are going to play "Dictator Game" in a class of professor Shilish.

This game will consist of $n \cdot (n-1)$ rounds, one round for each ordered pair (i, j) of people ($i \neq j$).

You are given a positive integer s. In each round s coins will be distributed between people i and j if they agree. In the round for pair (i, j), player i is proposer and player j is responder. Player i should propose to player j some integer number of coins c ($0 \leq c \leq s$) to take. If j agrees, then in this round player i gets $s - c$ coins and player j gets c coins. Otherwise both players get 0 coins. At the end of the game the score of each player is the total number of coins that this player has received during the game.

All players decided to stick with the following strategy: each player i selects an integer a_i ($0 \leq a_i \leq s$). In each round where player i participates (in any role) they want to get at least a_i coins from this deal in case of agreement. So they will propose some number of coins and agree with some number of coins if this condition will be satisfied in case of agreement. The numbers $a_1, a_2, \ldots, a_n$ are known to everyone before the game and will be used by players to make optimal proposals and get the highest score at the end of the game. In each round proposer will try to get an agreement, if it is possible.

Player i got the information about array a before other players. To get a higher score, they can change value a_i to any other integer between 0 and s. Note that only player i will change their value. What is the highest possible score they can get if the value is selected optimally, and what is the number of optimal choices? Find the answer for all players i. Note that you should calculate these answers for all players independently.

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \leq t \leq 10^5$). The descriptions of the test cases follow.

The first line of each test case contains two integers n, s ($1 \leq n \leq 5 \cdot 10^5$, $1 \leq s \leq 10^{12}$) — the number of players and the number of coins that will be used in each round.

The second line of each test case contains n integers $a_1, a_2, \ldots, a_n$ ($0 \leq a_i \leq s$).

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

Output

For each test case print n lines. On the i-th line print two integers: the highest possible score that player i can achieve and the number of ways to select a_i to get this highest possible score.

Example

standard input	*standard output*
5 1 1000000000000 0 3 6 3 5 6 5 100 45 30 70 55 45 4 6 6 2 6 6 4 5 5 0 3 0	0 1000000000001 2 1 6 1 6 2 320 1 305 1 405 1 345 1 320 1 8 1 0 7 8 1 8 1 20 1 11 1 20 1 11 1