Problem G
All for The Central Region

Time Limit: 2 seconds
Memory Limit: 512 Megabytes

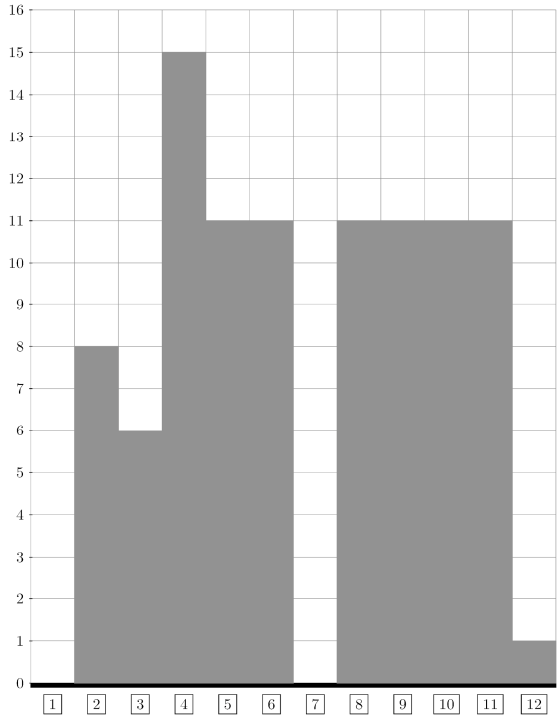
Problem description

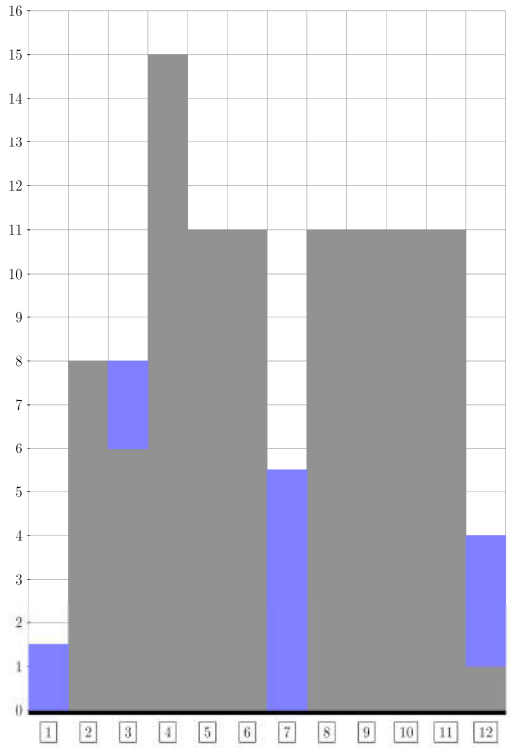
This year's stormy situation is going very complicatedly in the Central region, causing very heavy damage. These days, heavy rains appear again, causing widespread flooding.

In a valley surrounded by high mountains, the water inside cannot flow out and vice versa. The topography in the area is represented on the Ox coordinate axis consisting of N areas with the same size, the array A contains N integers which are the altitudes of them. In the near future, it will rain with precipitation H, meaning that per unit of rain will cause water levels of elevation H (in theory). Rainwater will flow from high to low. If a group is **higher** than its 2 neighbors, the water will flow to the side with equal volume.

To be precise, let A[i], F[i] be the altitude and the water amount of the i-th area. We can see that the surface of the i-th area will be at the altitude of A[i] + F[i]. Adjacent areas with the same water surface form a group. If a group's surface altitude is higher than its 2 neighbouring groups, the additional rain water will flow to its neighbors (the amount is divided evenly) until we are clear of rain or the water level of its neighbor rises and they form a bigger group.

Consider the following example:





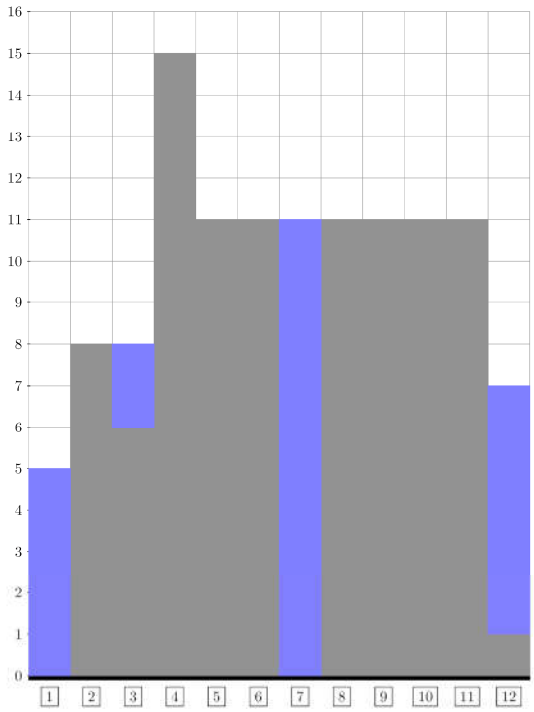
This is H=1. Note that:

Area 1 is getting 1 from the rain in place, 0.5 from area 2, thus F[1] = 1.5

Area 3 is getting 1 from the rain in place, 0.5 from area 2 and 0.5 from area 4, thus F[3] = 2.

Area 7 is getting 1 from the rain in place, 0.5 from area 2, all 2 units from area 5 and area 6 and half of the group contains area 8, 9, 10, 11. Thus F[7] = 5.5.

Area 12 is getting 1 from the rain in place and half of the group contains area 8, 9, 10, 11… Thus, F[12]=3

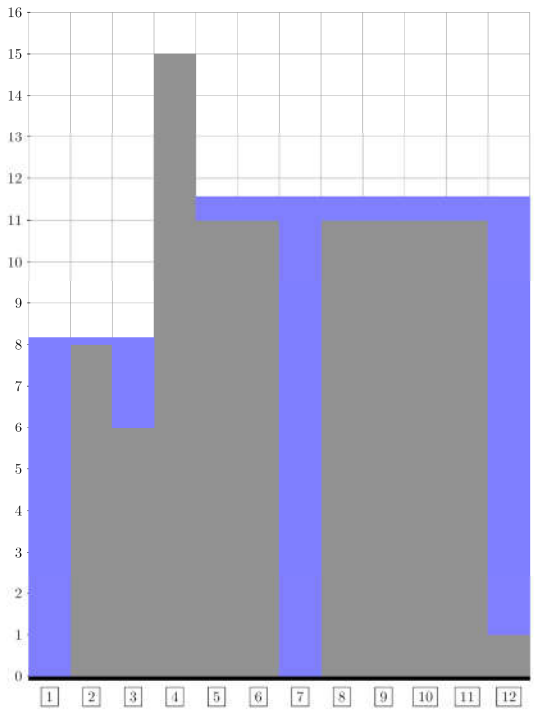


This is H=2. Note that area 2 and area 3 are now forming a group.

Area 1 will get 1 from the rain in place, 0.5 from area 4 and all 2 units from area 5 and 6. Thus, F[1] = 5

Area 7 will get extra 5.5 like the last time.

Area 12 will get extra 3 like the last time.



This is H=3. Note when H=2, area 7 to 11 are forming a new group.

Given the area's topography and precipitation, determine the water level in each area.

Input

The first line includes T $(1 \leq T \leq 10)$, the number of test cases.

The first line of each test case consists of 2 integers N and H. Number of areas in the valley and precipitation $(1 \leq N \leq 1000, 1 \leq H \leq 10^5)$.

The next line contains N integers $A_i (1 \leq i \leq N, 0 \leq A_i \leq 10^5)$- Altitude of each area.

Output

Including T lines corresponding to each test case.

Each line contains N decimals accurate to 10^{-4}as the result of each test case.

Example:

Input	Output
3 3 1 1 1 3 12 1 0 8 6 15 11 11 0 11 11 11 11 1 12 2 0 8 6 15 11 11 0 11 11 11 11 1	1.5 1.5 0 1.5 0 2 0 0 0 5.5 0 0 0 0 3 5 0 2 0 0 0 11 0 0 0 0 6