4 Average Replacement

4.1 **Problem Description**

There are *n* people in a group and *m* pairs of friends among them. Currently, each person writes an integer on his hat. They plan to play the following game many times: everyone replaces his number on his hat with the average number of his number and all of his friends' numbers. That is, if before the game the person has a_0 written on his hat and a total of *k* friends, each having number a_1, \ldots, a_k , then after the game the number on his hat becomes $(a_0 + \cdots + a_k)/(k+1)$. Note that numbers may become non-integers.

It can be proved that by playing more and more games, each number converges to a certain value. Given the initial numbers written on the hats, your task is to calculate these values.

4.2 Input

The first line contains the number of test cases T $(1 \le T \le 100)$.

For each test case, the first line contains two integers $n, m \ (1 \le n, m \le 10^5)$

The second line contains n integers a_1, a_2, \cdots, a_n $(1 \le a_i \le 10^8)$, indicating the number on each hat.

Each of the following m lines contains two integers $u,v \ (1 \leq u,v \leq n)$, indicating a pair of friends.

It's guaranteed that there are no self-loop or multiple edges on the graph, and there are at most 20 test cases such that n > 1000 or m > 1000.

4.3 Output

For each test case, output n real numbers in n lines, indicating the value of each person at last. The results should be reserved with 6 digits after the decimal point.

4.4 Sample Input

4.5 Sample Output

1.500000

1.500000

1.500000

1.500000

3.500000 3.500000