## 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 $\left(a_{0}+\cdots+a_{k}\right) /(k+1)$. 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 $T(1 \leq T \leq 100)$.
For each test case, the first line contains two integers $n, m\left(1 \leq n, m \leq 10^{5}\right)$
The second line contains $n$ integers $a_{1}, a_{2}, \cdots, a_{n}\left(1 \leq a_{i} \leq 10^{8}\right)$, 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

2
21
12
12
42
234
12
34

### 4.5 Sample Output

1.500000
1.500000
1.500000
1.500000
3.500000
3.500000

