ETH Zürich
Institute of Theoretical Computer Science
Prof. Emo Welzl
Dr. Johannes Lengler

FS 2021

Algorithmen und Wahrscheinlichkeit
Programming Exercises

Exercise 1 – *Island tribes*

In a galaxy far, far away... there is a strange island called a BHN Island. Inhabitants of the island are divided into three tribes: *Bears*, *Hunters*, and *Ninjas* (hence the name).

The tribes are very hostile towards each other and fight for survival on this small and not too resourceful island. At every moment in time two uniformly at random inhabitants meet and if they belong to different tribes the stronger one always kills the weaker one. It is well known that *a bear is stronger than a ninja*, *a ninja is stronger than a hunter*, and *a hunter is stronger than a bear*.

After some long period of time, only members of one tribe will remain living on the island. Your task is to compute the probability of each tribe surviving.

Input The first line of the input contains the number $t \leq 100$ of test cases. Each of the t test cases is described as follows.

- It contains a single line with three integers `b h n`, separated by a space, denoting the number of Bears ($0 \leq b \leq 100$), the number of Hunters ($0 \leq h \leq 100$), and the number of Ninjas ($0 \leq n \leq 100$).

Output For each test case output one line with the probability of each of the tribes surviving, separated by a space. Your solution is going to be accepted if it has an absolute or relative error of at most 10^{-5}.

Points This exercise is worth 100 points.

Sample Input

```
3
2 2 2
2 1 2
1 0 0
```

Sample Output

```
0.333333 0.333333 0.333333
0.55 0.3 0.15
1.0 0.0 0.0
```