Problem C: Orbs of Fusing

Path of Exile is a interesting take on a Diablo-style action role-playing game (ARPG). The goal of the game (actually, of an ARPG in general) is quite straightforward: kill monsters to acquire better gear so that you can kill stronger monsters (which in turn drop better gear...). It turns out that this is spectacularly addicting.

One thing high quality gear in Path of Exile has is **slots** on an item, which may be connected by **links**. You can think of the S **slots** on an item as being strung in a long line, with $S-1$ possible places to **link** the **slots** together. In general, the quality of an item is directly related to the maximum chain of connected **slots** on an item (if all the **links** on the item are present, then the maximum chain would have length S, otherwise, it will be less than S).

Here's where the fun begins: one of the cool items dropped in the game is called an "orb of fusing". The orb of fusing re-forges the **links** on an item in the following way: each **link** is randomly generated with probability 0.5, but subject to the constraint that the **links** must change after using the orb. If the re-forging process generates the exact same set of **links** that was already present (this happens with probability $\frac{1}{2^{S-1}}$), then the re-forging process repeats anew.

I currently have F orbs of fusing, and my item has no **links**. I'm going to keep using them on this item until I get a chain of at least L **linked slots** (or until I run out of orbs). Can you tell me the probability that I'll be successful?

Input Specification:

The input begins with an integer $T \leq 30$, the number of test cases. Following this are T lines, each with three positive integers: $2 \leq S \leq 1337$, $F \leq 1337$, and $L \leq S$.

Output Specification:

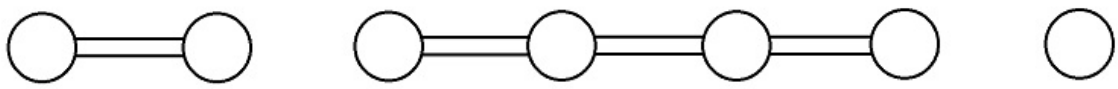
For each test case, output a number rounded to 5 decimal places: the probability that I will attain an item with a chain of at least L **linked slots**.

Sample Input:

```
2
3 1 3
6 10 5
```

Sample Output:

```
0.33333
0.63862
```



This is a picture of an item with 7 **slots** and a maximum chain of 4 **linked slots**

Andrew Henrey