Problem E: Randomize

For her new ICS assignment, Caroline needs to design a program that uses random numbers. However, she discovers that Ms. Dyke has forbidden using any built-in functions! Now, she needs to create a random number generator to make her assignment work. After checking online, she finds that random numbers can be generated using the following function:

Where SEED is some initial value between 0 and P-1 inclusive. After some tinkering she finds that for most values of **A**, **B**, and **P**, the generated numbers quickly fall into a repeating cycle. She’d like to figure out which values of **A**, **B**, and **P** produce the best results and has enlisted your help to find the average length of a cycle for one set of values.

**Note:** The cycle length for some value of SEED is defined as smallest value N for which produces a number already in the sequence. For example, if then the cycle length is 3, as 3 was already in the sequence.

The average length of a cycle is defined as the average of the cycle lengths for every possible value of SEED.

**Input:**

The first line of the input provides the number of test cases, **T** (1 ≤ **T** ≤ 100). **T** test cases follow. Each test case contains 3 integers, **A, B,** and **P** (1 ≤ **A**, **B**, **P** ≤ 106).

For the first 20% of cases, **A**, **B**, **P** ≤ 103.

**Output:**

For each test case, your program should output one real number, rounded to 6 decimal places, the average length of a cycle.

**Sample Input:**

2

3 2 5

4 5 3

**Sample Output:**

3.400000

3.000000

**Explanation of Sample Input:**

In the second test case, if you start with a SEED of 0, then

Since 0 is already in the sequence, the cycle length is 3. Starting with 1 or 2 will also result in a cycle length of 3, so the average cycle length is 3.