

Project Euler #205: Dice Game

This problem is a programming version of [Problem 205](#) from [projecteuler.net](#)

Peter has n_p s_p -sided dice, each with faces numbered $1, 2, \dots, s_p$.
Colin has n_c s_c -sided dice, each with faces numbered $1, 2, \dots, s_c$.

Both Peter's and Colin's dice are uniform and fair — for each die every outcome occurs with the equal probability of $\frac{1}{s_p}$ in Peter's case and $\frac{1}{s_c}$ in Colin's case.

Peter and Colin roll their dice and compare totals: the highest total wins. The result is a draw if the totals are equal.

What is the probability that s_p -sided Pete beats s_c -sided Colin? If the answer is $\frac{p}{q}$, then give it as $p \times q^{-1} \pmod{1012924417}$.

Input Format

The first line of each test file contains a single integer q , which is the number of queries per this file. q lines follow with 4 integers separated by single spaces on each: the corresponding n_p, s_p, n_c and s_c .

Constraints

- $1 \leq q, n_p, n_c$
- $4 \leq s_p, s_c$
- $\sum_{\text{all queries per test file}} \max(n_p \times s_p, n_c \times s_c) \leq 10^6$

Output Format

Print exactly q lines with the answer for the corresponding query on each.

Sample Input 0

```
1
1 4 1 4
```

Sample Output 0

```
633077761
```

Explanation 0

There are **16** combinations in total. Peter wins Colin in **6** of them:

- Peter: **2**, Colin: **1**
- Peter: **3**, Colin: **1**
- Peter: **3**, Colin: **2**
- Peter: **4**, Colin: **1**
- Peter: **4**, Colin: **2**
- Peter: **4**, Colin: **3**

$$6/16 = 3/8$$

$$3 \times 8^{-1} = 3 \times 886308865 = 633077761 \pmod{1012924417}$$