Project Euler #205: Dice Game

Peter has n_p s_p-sided dice, each with faces numbered $1..s_p$.

Colin has n_c s_c-sided dice, each with faces numbered $1..s_c$.

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

- $1 \leq q, n_p, n_c$

- $4 \leq s_p, s_c$

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

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

$6/16 = 3/8$

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