

Contest Duration: 2025-05-31(Sat) 22:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250531T2100&p1=248>) - 2025-05-31(Sat) 23:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250531T2240&p1=248>) (local time) (100 minutes)

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## G - $A/B < p/q < C/D$

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Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 625 points

### Problem Statement

You are given positive integers  $A, B, C, D$  satisfying  $\frac{A}{B} < \frac{C}{D}$ .

Find the smallest positive integer  $q$  satisfying the following condition:

- There exists a positive integer  $p$  such that  $\frac{A}{B} < \frac{p}{q} < \frac{C}{D}$ .

$T$  test cases are given, so solve each.

### Constraints

- $1 \leq T \leq 2 \times 10^5$
- $1 \leq A, B, C, D \leq 10^{18}$
- $\frac{A}{B} < \frac{C}{D}$
- All input values are integers.

### Input

The input is given from Standard Input in the following format:

2026-01-02 (Fri)  
05:24:59 +11:00

$T$   
 $\text{case}_1$   
 $\text{case}_2$   
 $\vdots$   
 $\text{case}_T$

Here,  $\text{case}_i$  represents the  $i$ -th test case.

Each test case is given in the following format:

$A \ B \ C \ D$

## Output

Output  $T$  lines. The  $i$ -th line should contain the answer for the  $i$ -th test case.

### Sample Input 1

Copy

```
5
3 2 2 1
5 2 8 3
1 2 2 1
60 191 11 35
40 191 71 226
```

Copy

### Sample Output 1

Copy

```
3
5
1
226
4
```

Copy

Consider the first test case.

For example, if  $p = 5$ ,  $q = 3$ , then  $\frac{3}{2} < \frac{5}{3} < \frac{2}{1}$ , so  $q = 3$  satisfies the condition.

There is no positive integer less than 3 that satisfies the condition for  $q$ , so the answer for the first test case is 3.

#telegram)

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