C. Success Rate

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are an experienced Codeforces user. Today you found out that during your activity on Codeforces you have made y submissions, out of which x have been successful. Thus, your current success rate on Codeforces is equal to x / y.

Your favorite rational number in the $[0;1]$ range is p / q. Now you wonder: what is the smallest number of submissions you have to make if you want your success rate to be p / q?

Input

The first line contains a single integer t ($1 \le t \le 1000$) — the number of test cases.

Each of the next t lines contains four integers x, y, p and q ($0 \le x \le y \le 10^9$; $0 \le p \le q \le 10^9$; $y > 0$; $q > 0$).

It is guaranteed that p / q is an irreducible fraction.

Hacks. For hacks, an additional constraint of $t \le 5$ must be met.

Output

For each test case, output a single integer equal to the smallest number of submissions you have to make if you want your success rate to be equal to your favorite rational number, or `-1` if this is impossible to achieve.

Example

input
4 3 10 1 2 7 14 3 8 20 70 2 7 5 6 1 1
output
4 10 0 -1

Note

In the first example, you have to make 4 successful submissions. Your success rate will be equal to $7 / 14$, or $1 / 2$.

In the second example, you have to make 2 successful and 8 unsuccessful submissions. Your success rate will be equal to $9 / 24$, or $3 / 8$.

In the third example, there is no need to make any new submissions. Your success rate is already equal to $20 / 70$, or $2 / 7$.

In the fourth example, the only unsuccessful submission breaks your hopes of having the success rate equal to 1.