

Problem E. Add or XOR

Time Limit 1000 ms

Mem Limit 262144 kB

[r-906 & IA AI - Psychologic Disco](#)

You are given two non-negative integers a, b . You can apply two types of operations on a any number of times and in any order:

- $a \leftarrow a + 1$. The cost of this operation is x ;
- $a \leftarrow a \oplus 1$, where \oplus denotes the [bitwise XOR operation](#). The cost of this operation is y .

Now you are asked to make $a = b$. If it's possible, output the minimum cost; otherwise, report it.

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \leq t \leq 10^4$). The description of the test cases follows.

The only line of each test case contains four integers a, b, x, y ($1 \leq a, b \leq 100, 1 \leq x, y \leq 10^7$) — the two integers given to you and the respective costs of two types of operations.

Output

For each test case, output an integer — the minimum cost to make $a = b$, or -1 if it is impossible.

Examples

Input	Output
7	3
1 4 1 2	6
1 5 2 1	1
3 2 2 1	3
1 3 2 1	-1
2 1 1 2	-1
3 1 1 2	990000000
1 100 10000000 10000000	

Note

In the first test case, the optimal strategy is to apply $a \leftarrow a + 1$ three times. The total cost is $1 + 1 + 1 = 3$.

In the second test case, the optimal strategy is to apply $a \leftarrow a + 1$, $a \leftarrow a \oplus 1$, $a \leftarrow a + 1$, $a \leftarrow a \oplus 1$ in order. The total cost is $2 + 1 + 2 + 1 = 6$.

In the fifth test case, it can be proved that there isn't a way to make $a = b$.