

# Square Permutation II

Input file:            **standard input**  
Output file:           **standard output**  
Time limit:            3 seconds  
Memory limit:         1024 megabytes

Give two permutations  $p$  and  $q$  of length  $n$ . It is guaranteed that  $n$  is an odd number. You must perform exactly one of the following operations for each position  $i \in [1, n]$ :

1. Perform no operation at no cost.
2. Spend a cost of  $x$  to either modify  $p_i$  to  $p_i^2$  or modify  $q_i$  to  $q_i^2$ .
3. Spend a cost of  $y$  to modify both  $p_i$  to  $p_i^2$  and  $q_i$  to  $q_i^2$ .

There are a total of  $m$  groups of queries in this problem. For each query, values of  $x$ ,  $y$ ,  $A$  and  $B$  are given. Please find the minimum cost required to make the median of array  $p$  equal to  $A$  and the median of array  $q$  equal to  $B$ . If it's impossible, output  $-1$ .

## 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 first line of each test case contains two single integers  $n, m$  ( $1 \leq n, m \leq 10^5$ ).

The second line gives  $n$  positive integers, representing the permutation  $p$ .

The third line gives  $n$  positive integers, representing the permutation  $q$ .

The next  $m$  lines each contain four positive integers  $A, B, x$ , and  $y$  ( $1 \leq A, B \leq n^2, 1 \leq x \leq y \leq 10^9$ ).

It is guaranteed that the sum of  $n$  and  $m$  over all test cases does not exceed  $10^5$ .

## Output

For each set of data, output  $m$  lines. The  $i$ -th line contains an integer representing the answer to the  $i$ -th query.

## Example

standard input	standard output
1	4
5 6	6
1 3 2 5 4	-1
3 2 1 4 5	-1
4 9 1 4	8
5 9 1 3	42
5 16 3 3	
16 5 3 4	
5 5 2 3	
9 9 10 11	