Problem G. 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 ($1 \le t \le 10^4$) . The description of the test cases follows.

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

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 ($1 \le A, B \le n^2, 1 \le x \le y \le 10^9$).

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