

A wrestling tournament is held between  $n$  members of team red and  $m$  members of team blue. A total of  $k$  fights are held in the event where  $k$  is an odd number. Every fight involves one member of team red against one of team blue. Same wrestler can be a part of multiple fights. Also, the same two wrestlers might fight more than once.

All  $(n+m)$  participants are numbered from  $1$  to  $(n+m)$  in no particular order. All of them have a fixed power level. The power of  $i^{\text{th}}$  wrestler is  $P_i$  where  $i$  can vary from  $1$  to  $(n+m)$ . No two participants have the same power and the winner of every fight will be the wrestler with a higher power level in that particular fight.

The  $i^{\text{th}}$  fight is held between fighters  $F_{2^{i-1}}$  and  $F_{2^i}$  where  $i$  can vary from  $1$  to  $k$ . Given the arrays  $P_1, P_2, \dots, P_{n+m}$  and  $F_1, F_2, \dots, F_{2^k}$ , find the margin of victory for the winning team.

Print the difference between the fights won by the winning and losing team. If it is not possible to accurately differentiate the fighters of the two teams using the given fixtures, print  $-1$ .

Input format:

First line contains an integer  $t$ , where  $t$  is the number of test cases.

In each test case, first line contains the integer  $w$ , where  $w=n+m$

Next line of test case contains  $w$  integers representing powers of wrestlers :

$P_1, P_2, \dots, P_w$

Third line contains the integer  $k$ , which represents the number of fixtures.

Last line of test case contains  $(2 * k)$  integers :  $F_1, F_2, \dots, F_{2^k}$

Constraints:

$1 \leq t \leq 10$

$2 \leq w \leq 2000$

$1 \leq P_i \leq 5000$

$1 \leq k \leq 20000$

Output format:

Print the margin of victory (difference between matches won and lost by winning team) or  $-1$  if the teams cannot be differentiated in a new line for each test case.

Sample input:

2

5

10 100 50 15 60

5

1 2 3 4 2 5 2 3 3 2

4

100 200 300 400

3  
1 2 2 1 3 4

Sample output:

3  
-1

Explanation:

Test case 1: Since fights are always held between players of opposite teams, based on the input, it can be seen the wrestlers 1, 3 and 5 form one team and wrestlers 2 and 4 form the other team.

Based on power ratings, the second team wins 4 fights and loses 1. Hence the margin of victory is 3.

Test case 2: The 2 teams cannot be predicted using the given info.