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## Zonal Computing Olympiad 2011, 4 Dec 2010

2:00 pm–5:00 pm IST

### Problem 2 : Balancing Act

Your team is playing a chess tournament against a visiting team. Your opponents have arrived with a team of  $M$  players, numbered  $1, 2, \dots, M$ . You have  $N$  players, numbered  $1, 2, \dots, N$  from which to choose your team, where  $N \geq M$ .

Each of the  $M$  players from the visiting team must be paired up with one of your  $N$  players. The tournament rules insist that the pairings must respect the order that has been fixed for both teams. That is, when you pick players  $i_1, i_2, \dots, i_M$ , to play against opponents numbered  $1, 2, \dots, M$ , it must be the case that  $i_1 < i_2 < \dots < i_M$ , in terms of the order  $1, 2, \dots, N$  in which your players are listed.

You want to ensure a good fight, so you plan to pick your team so that the teams are as evenly balanced as possible. Each player  $j$  on your team has a numerical score  $YS(j)$  that represents his or her playing ability. Likewise, each player  $i$  in the opponent team has a playing ability indicated by a numerical score  $OS(i)$ . The difference in strength between a player  $i_j$  from your team and his or her opponent  $j$  on the visiting team is the absolute value  $|YS(i_j) - OS(j)|$ . The imbalance of a pairing is the sum of these differences across all  $M$  match-ups in the pairing. Your aim is to minimize this imbalance.

For instance suppose you have six players, whose strengths are as follows.

Home Team						
$i$	1	2	3	4	5	6
$YS(i)$	2	3	4	1	5	7

Also, suppose that the visiting team has three players, whose strengths are as follows.

Visiting Team			
$i$	1	2	3
$OS(i)$	2	9	2

In this situation, the most balanced pairing is  $(1,1)$ ,  $(3,2)$  and  $(4,3)$ , which yields an imbalance of  $|YS(1)-OS(1)|+|YS(3)-OS(2)|+|YS(4)-OS(3)| = |2-2|+|4-9|+|1-2| = 6$ .

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Your task is to read a description of the two teams and calculate the overall imbalance in the most balanced pairing.

## Input format

The first line of input contains two integers  $N$  and  $M$ ,  $N \geq M$ , the number of players on the home team and the visiting team, respectively. The second line of input contains  $N$  positive integers, the strengths of the home team players in the order  $1, 2, \dots, N$ . The third line of input contains  $M$  integers, the strengths of the visiting team players in the order  $1, 2, \dots, M$ .

## Output format

A single line with a single integer indicating the sum of the differences in strengths in the most balanced pairing.

## Testdata

You may assume that  $1 \leq M \leq N \leq 2000$ . All players' strengths are in the range  $[1, 2000]$ .

## Sample Input

```
6 3
2 3 4 1 5 7
2 9 2
```

## Sample Output

```
6
```

## Time and memory limits

The time limit for this task is 2 seconds. The memory limit is 64MB.

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