

# Minimum Scalar Product

**Problem ID:** minimumscalar

**CPU Time limit:** 1 second


**Memory limit:** 1024 MB

**Difficulty:** 2.5

You are given two vectors  $v_1 = (x_1, x_2, \dots, x_n)$  and  $v_2 = (y_1, y_2, \dots, y_n)$ . The scalar product of these vectors is a single number, calculated as  $x_1y_1 + x_2y_2 + \dots + x_ny_n$ .

Suppose you are allowed to permute the coordinates of each vector as you wish. Choose two permutations such that the scalar product of your two new vectors is the smallest possible, and output that minimum scalar product.

**Source:** Google Code Jam 2008 Round 1A

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## Input

The first line of the input file contains the number of testcases,  $T \leq 10$ . For each test case, the first line contains integer number  $n$ . The next two lines contain  $n$  integers each, giving the coordinates of  $v_1$  and  $v_2$  respectively.

You may assume that  $1 \leq n \leq 800$  and  $-100\,000 \leq x_i, y_i \leq 100\,000$ .

## Output

For each test case, output a line

Case #X: Y

where  $X$  is the test case number, starting from 1, and  $Y$  is the minimum scalar product of all permutations of the two given vectors.

### Sample Input 1

```
2
3
1 3 -5
-2 4 1
5
1 2 3 4 5
1 0 1 0 1
```

### Sample Output 1

```
Case #1: -25
Case #2: 6
```