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Best 2x2 Sudoku   Problem Code: SUDOKU22

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You are given an array of size 4 by 4. Each integer in the array lies between 1 and 4, inclusive. You wish to modify the values in this array such that after all the modifications, the resultant array is a solution of a 2x2 Sudoku. Find the solution whose variance with the original array is as small as possible.

A solution of 2x2 Sudoku has the following properties

- The array has 4 rows and 4 columns.
- The numbers 1, 2, 3 and 4, each appears exactly once in each row.
- The numbers 1, 2, 3 and 4, each appears exactly once in each column.
- The numbers 1, 2, 3 and 4, each appears exactly once in the 2x2 square formed by the intersection of rows 1, 2 and columns 1, 2.
- The numbers 1, 2, 3 and 4, each appears exactly once in the 2x2 square formed by the intersection of rows 1, 2 and columns 3, 4.
- The numbers 1, 2, 3 and 4, each appears exactly once in the 2x2 square formed by the intersection of rows 3, 4 and columns 1, 2.
- The numbers 1, 2, 3 and 4, each appears exactly once in the 2x2 square formed by the intersection of rows 3, 4 and columns 3, 4.

Note that if you have experience with a 3x3 Sudoku, the 2x2 Sudoku is indeed a simpler version of the same, with exactly the same restrictions.

The variance between two arrays of size 4 by 4 is calculated by finding the sum of the squared absolute difference between values at the same index. The following pseudo-code calculates the variance between two 4 by 4 arrays A and B respectively

```
variance = 0
for i = 1 to 4
      for j = 1 to 4
              difference = A[i][j] - B[i][j]
              absolute_difference = (difference < 0 ? -difference :
difference)
              squared_absolute_difference = absolute_difference *
absolute_difference
              variance = variance + squared_absolute_difference
```

Among all the possible solutions to the 2x2 Sudoku, find the solution such that the variance between that solution and the original array is as small as possible. Output this minimized variance.

Input

The first line of input contains a singe integer T, the number of test cases (not more than 100). Then follows the description of T test cases. Each test case is described in exactly 4 lines. Each line contains exactly 4 integers, whose value lies between 1 and 4, inclusive. The integers are separated by single space characters. Note that there are no blank lines between test cases.
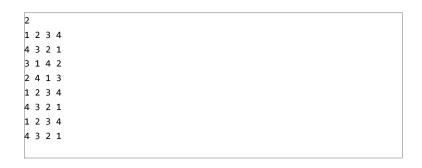
Output

Output a single integer for each test case on a line by itself. This value should be the variance of the solution with the minimal variance to the original array for this test case.

Sample Input

```
2
1 2 3 4
4 3 2 1
3 1 4 2
2 4 1 3
1 2 3 4
4 3 2 1
1 2 3 4
4 3 2 1
```

Sample Output

```
0
8
```

Explanation

The first test case is already a solution to a 2x2 Sudoku. Hence the minimal variance solution is the array itself. The answer is 0 in this case.

In the second test case there are 16 different solutions which give the variance of 8. There is no solution with a variance smaller than 8. Two of the 16 solutions are given below.

```
Possible Solution 1:
1 2 3 4
3 4 1 2
2 1 4 3
4 3 2 1

Possible Solution 2:
2 1 4 3
4 3 1 2
1 2 3 4
3 4 2 1
```

Attention

There are only 288 different solutions to 2x2 Sudoku. You can consider each solution and find the variance of each one from the input (thus considering the smallest one). The constraints are designed such that you can comfortably find all the solutions. It is suggested that you store all the possible solutions at the beginning of the program to process each test case faster..

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Tags:	directi_campus (/tags/problems/directi_campus)
Date Added:	18-10-2014
Time Limit:	1 secs
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Languages:	C, CPP 4.3.2, CPP 6.3, CPP14, JAVA, PYTH, PYTH 3.5

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