

You have been given the job of forming the quiz teams for the next ‘MCA CPCI Quiz Championship’. There are $2 * N$ students interested to participate and you have to form N teams, each team consisting of two members. Since the members have to practice together, all the students want their members house as near as possible. Let x_1 be the distance between the houses of group 1, x_2 be the distance between the houses of group 2 and so on. You have to make sure the summation $(x_1 + x_2 + x_3 + \dots + x_n)$ is minimized.

Input

There will be many cases in the input file. Each case starts with an integer N ($N \leq 8$). The next $2 * N$ lines will given the information of the students. Each line starts with the students name, followed by the x coordinate and then the y coordinate. Both x, y are integers in the range 0 to 1000. Students name will consist of lowercase letters only and the length will be at most 20.

Input is terminated by a case where N is equal to 0.

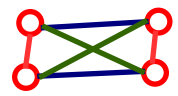
Output

For each case, output the case number followed by the summation of the distances, rounded to 2 decimal places. Follow the sample for exact format.

Sample Input

```
5
sohel 10 10
mahmud 20 10
sanny 5 5
prince 1 1
per 120 3
mf 6 6
kugel 50 60
joey 3 24
limon 6 9
manzoor 0 0
1
derek 9 9
jimmy 10 10
0
```

each i-->2*N %*c skip names
....name x y



re-arrange

Sample Output

```
Case 1: 118.40
Case 2: 1.41
```

Category: DP
discussed in section 1.1