

2650 Match

Be a match maker.

The dating service MatchMaker.com has a list of men and a list of women. The number of men is equal to the number of women. In addition to their names, MatchMaker.com keeps track of two attributes about each of their clients: the person's IQ (intelligence quotient) and the person's height. MatchMaker.com wishes to match each man with a woman in an optimal way, so that the deviations of the two attributes in the resulting man / woman pairs are minimized.

Input

The input file will consist of one or more data sets of the form

```

N
WOMAN_NAME(1) WOMAN_IQ(1) WOMAN_HEIGHT(1)
WOMAN_NAME(2) WOMAN_IQ(2) WOMAN_HEIGHT(2)
.
.
.
WOMAN_NAME(N) WOMAN_IQ(N) WOMAN_HEIGHT(N)
MAN_NAME(1) MAN_IQ(1) MAN_HEIGHT(1)
MAN_NAME(2) MAN_IQ(2) MAN_HEIGHT(2)
.
.
.
MAN_NAME(N) MAN_IQ(N) MAN_HEIGHT(N)

```

N will be a positive integer not larger than 13. The *NAME* of men and women will consist of no more than 11 lower case alphanumeric characters ('a'..'z', '0'..'9'). The *IQ* will be an integer in the range 10..199. The *HEIGHT* will be an integer in the range 145..189. One or more blank spaces will separate the *NAME*, *IQ* and *HEIGHT* values, but there will be no leading or trailing white space.

Output

For each N man-woman pairs in the input data set, there will be $N + 2$ lines of output in the format:

```

N
WOMAN_PAIR_NAME(1) MAN_PAIR_NAME(1) PAIR_DEVIATION(1)
WOMAN_PAIR_NAME(2) MAN_PAIR_NAME(2) PAIR_DEVIATION(2)
.
.
.
WOMAN_PAIR_NAME(N) MAN_PAIR_NAME(N) PAIR_DEVIATION(N)
TOTAL_DEVIATION

```

Each woman-man pair name is separated by exactly one blank space. The *PAIR_DEVIATION* is defined as the absolute value of the difference in IQ, plus the absolute value of the difference in height of the pair.

The *TOTAL_DEVIATION* is the sum of the *PAIR_DEVIATION*. The crucial constraint on the output is that the pairing should minimize the *TOTAL_DEVIATION* compared to all possible man-woman pairings. Note that there may be more than one such minimal configuration.

Sample Input

```
7
mindy 70 145
jennifer 80 155
kathy 90 165
allison 100 175
alice 105 156
jenna 110 158
mary 115 160
john 110 175
jack 85 170
steve 115 170
bill 105 149
bob 80 155
thomas 75 179
mike 120 168
3
mindy 100 180
jenny 120 155
kathy 105 168
jack 104 169
bob 119 156
bill 99 179
```

Sample Output

```
7
mindy thomas 39
jenna mike 20
allison john 10
kathy jack 10
mary steve 10
alice bill 7
jennifer bob 0
96
3
jenny bob 2
kathy jack 2
mindy bill 2
6
```