

4463 Mentoring Assignment

The ACM, which is a charitable society for men, runs a program to support troubled adolescents via the help of mature volunteers. The program aims to pair an adolescent with a volunteer to provide the adolescent with the best possible mentoring and to provide the volunteer with a rewarding experience. Towards that goal, each volunteer and each adolescent is required to perform a personality- profiling test. A test reports a score for each of the N different personality traits. The scores are inclusive of one to a hundred. The report has the following form:

PersonCategory < name > s_1 s_2 s_3 ... s_N ,

where *PersonCategory* is either 'Adolescent' or 'Volunteer', and each s_i ($1 \leq i \leq N$) is an integer value in the range of one (1) to one hundred (100), inclusive.

The ACM decided to assign weights to indicate the importance of each trait. The weights (w_1, w_2, \dots, w_N) used for adolescents are different from those weights (v_1, v_2, \dots, v_N) used for volunteers. The function

$$f_1(A, V) = (w_1(A_{s_1} - V_{s_1})^2 + w_2(A_{s_2} - V_{s_2})^2 + \dots + w_N(A_{s_N} - V_{s_N})^2)$$

is used to assign a numerical value to the quality of mentoring an adolescent A receives from volunteer V , and the function

$$f_2(A, V) = (v_1(A_{s_1} - V_{s_1})^2 + v_2(A_{s_2} - V_{s_2})^2 + \dots + v_N(A_{s_N} - V_{s_N})^2)$$

is used to assign a numerical value to the quality of experience volunteer V gets from mentoring adolescent A . A smaller value of f_1 indicates a higher quality of adolescent mentoring and a smaller value of f_2 indicates a higher quality of volunteer experience.

Assuming the names in each category are unique, your task is to write a program to prescribe a pairing of adolescents with volunteers such that no pair would be a better fit with each other than the pairing that your program prescribed for them. That is, no pair of an adolescent X and a volunteer Y has both values of $f_1(X, Y)$ and $f_2(X, Y)$ smaller than the values prescribed by your program for both of them.

Input

Input consists of multiple situations. Each situation starts with two integers on a separate line. The first integer N ($1 \leq N \leq 100$) represents the number of personality traits to be used, and the second integer P ($1 \leq P \leq 1000$) represents the number of adolescents and also the number of volunteers. The last situation is followed by a line containing two zeros that indicates the end of input data and should not be processed as a valid situation.

The second line contains N integers that describe the weights to be used for adolescents. Consecutive integers are separated by a single blank space, and each integer has a value of one (1) and ten (10) inclusive.

The third line contains N integers that describe the weights to be used for volunteers. Consecutive integers are separated by a single blank space, and each integer has a value of one (1) and ten (10) inclusive.

The following $2P$ lines describe the reports of $2P$ personality tests. Each such line starts with the *PersonCategory* followed, after a blank space, by a string with no white spaces that represents

the name followed, after a blank space, by N integers. The k -th integer ($1 \leq k \leq N$) has a value in the range of one (1) to one hundred (100) that represents the score for the k -th trait. The scores are separated by a blank space.

Output

For each situation, print the situation number (starting with 1, and using the format in the sample) on a separate line. The next P lines list the pairing of adolescents and volunteers (using the format in the sample) such that the adolescent names are listed in increasing lexicographic order.

Sample Input

```
2 3
1 1
1 1
Volunteer Smith 20 10
Adolescent Paul 20 30
Adolescent Peter 30 30
Volunteer Kevin 20 40
Volunteer Peter 50 10
Adolescent John 10 20
0 0
```

Sample Output

```
Situation 1:
Adolescent John Volunteer Smith
Adolescent Paul Volunteer Kevin
Adolescent Peter Volunteer Peter
```