

## Problem G

### Fast Food

**Source:** fastfood.(c|cc|pas|java)

**Input:** fastfood.in

The fastfood chain McBurger owns several restaurants along a highway. Recently, they have decided to build several depots along the highway, each one located at a restaurant and supplying several of the restaurants with the needed ingredients. Naturally, these depots should be placed so that the average distance between a restaurant and its assigned depot is minimized. You are to write a program that computes the optimal positions and assignments of the depots.

To make this more precise, the management of McBurger has issued the following specification: You will be given the positions of  $n$  restaurants along the highway as  $n$  integers  $d_1 < d_2 < \dots < d_n$  (these are the distances measured from the company's headquarter, which happens to be at the same highway). Furthermore, a number  $k$  ( $k \leq n$ ) will be given, the number of depots to be built.

The  $k$  depots will be built at the locations of  $k$  different restaurants. Each restaurant will be assigned to the closest depot, from which it will then receive its supplies. To minimize shipping costs, the *total distance sum*, defined as

$$\sum_{i=1}^n |d_i - (\text{position of depot serving restaurant } i)|$$

must be as small as possible.

Write a program that computes the positions of the  $k$  depots, such that the total distance sum is minimized.

### Input

The input file contains several descriptions of fastfood chains. Each description starts with a line containing the two integers  $n$  and  $k$ .  $n$  and  $k$  will satisfy  $1 \leq n \leq 200$ ,  $1 \leq k \leq 30$ ,  $k \leq n$ . Following this will  $n$  lines containing one integer each, giving the positions  $d_i$  of the restaurants, ordered increasingly.

The input file will end with a case starting with  $n = k = 0$ . This case should not be processed.

### Output

For each chain, first output the number of the chain. Then output an optimal placement of the depots as follows: for each depot output a line containing its position and the range of restaurants it serves. If there is more than one optimal solution, output any of them. After the depot descriptions output a line containing the total distance sum, as defined in the problem text.

Output a blank line after each test case.

## Sample Input

```
6 3
5
6
12
19
20
27
0 0
```

## Sample Output

```
Chain 1
Depot 1 at restaurant 2 serves restaurants 1 to 3
Depot 2 at restaurant 4 serves restaurants 4 to 5
Depot 3 at restaurant 6 serves restaurant 6
Total distance sum = 8
```