# Game of Beans II[†]

Jaba and Pieton, Queen and King of Starlands, are huge fans of the Game of Beans and play it often with each other. The Game of Beans is an intergalactic two player game in which players take turns (fully) removing some piles of beans from one of the two ends of a sequence of piles of beans. They must choose wisely from which end and how many piles they are going to remove from that end, since those choices will not only define how many beans they collect but also which piles will become available for their opponent to choose from.
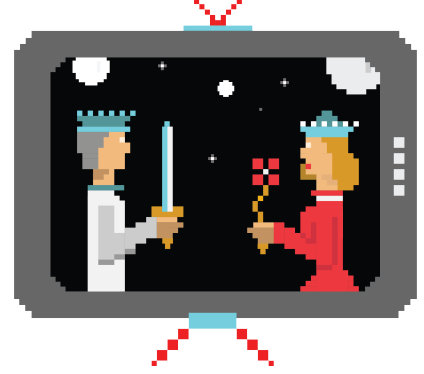
At the start of the game there is a non-empty sequence of piles, each with a positive or negative number of beans. Although it is surprising, there are bean piles of negative size in Starlands. The maximum number of piles that can be removed in a single play (called the *game depth*) is also fixed. The game ends when the last pile of beans is removed and the winner is the player who gathers the most beans during the course of the game. If both players have collected the same number of beans, there is a draw.

Queen Jaba and King Pieton use different strategies. Jaba plays optimally, i.e. she always ends up gathering the maximum possible amount of beans. Pieton's strategy is less elaborate (and less effective). In each play, he takes the piles whose sum of sizes is maximum. Whenever there are several such piles in a given play, King Pieton always prefers piles from the start (i.e. the leftmost side) of the sequence over piles from the end (i.e. the rightmost side) of the sequence. Among piles from the same side of the sequence whose sum of sizes is maximum, the King always chooses the least number of piles.

| Current Sequence | | | | | | | | Player | Sizes of Piles Removed |
|---|---|---|---|---|---|---|---|---|---|
| **2** | **-1** | **-1** | **-10** | **-1** | **20** | **-1** | **3** | Jaba | **2 , -1** |
| | **-1** | **-10** | **-1** | **20** | **-1** | **3** | | Pieton | **3** |
| | **-1** | **-10** | **-1** | **20** | **-1** | | | Jaba | **-1 , 20** |
| | **-1** | **-10** | **-1** | | | | | Pieton | **-1** |
| | | **-10** | **-1** | | | | | Jaba | **-1** |
| | | **-10** | | | | | | Pieton | **-10** |
| | | | | | | | | | |

For example, if the initial sequence has eight piles, with **2 -1 -1 -10 -1 20 -1 3** beans (in this order), the game depth is 2, and Jaba plays first, the moves of Jaba and Pieton are the following (see also the table above):

- Jaba could take the leftmost pile (with **2** beans), the two leftmost piles (collecting 1 bean), the rightmost pile (with **3** beans), or the two rightmost piles (totalizing 2 beans). As she plays optimally (maximizing her final score), she chooses the second option.

- Pieton maximizes always the beans taken in the play. Since $3 = \max(-1, -11, 3, 2)$, he takes the rightmost pile (with **3** beans).

- Then, Jaba removes the two piles on the right (and collects 19 beans).

- In his second play, since there are two ways to remove the largest number of beans, Pieton chooses the pile from the *left* side of the sequence (with **-1** bean).

- With just two piles left, Jaba takes the one with **-1** bean.

- Finally, Pieton takes the only remaining pile, which has **-10** beans.

Jaba wins this game: she gathers 19 beans (19 is her final score) whereas Pieton collects only $-8$.

Today, to celebrate their wedding anniversary, Jaba and Pieton decided to play the Game of Beans live on public television! Your secret diplomatic mission is to compute their final scores, in order to calm the looser down with a wonderful surprise as soon as the game ends (in case there is no draw) and Starlands remains a peaceful country.

## Task

Write a program that, given the initial sequence of bean piles, the game depth, and the player who plays first, computes the final score of Queen Jaba. (The final score of King Pieton is the total number of beans in the initial sequence minus the beans collected by his wife.)

## Input

On the input first line there is an integer, $T$, which represents the number of test cases.

For each test case there is a first line containing two integers, $P$ and $D$, which represent the number of piles at the start of the game and the game depth, respectively. The second line consists of $P$ integers, $s_1 s_2 \ldots s_P$, indicating how many beans exist in each pile. The third line has the name of the first to play: "`Jaba`" or "`Pieton`".

## Constraints

| | |
|---|---|
| $1 \le T \le 120$ | (Number of test cases) |
| $1 \le P \le 100$ | (Number of piles) |
| $1 \le D \le \min(P, 10)$ | (Game depth) |
| $(-100 \le s_i \le -1) \vee (1 \le s_i \le 100)$ | (Size of the $i^{\text{th}}$ pile, for every $i = 1, 2, \ldots, P$) |

## Output

The output consists of $T$ lines, each with a single number $x$. In the $j^{\text{th}}$ line, $x$ denotes Jaba's final score for the game defined in the $j^{\text{th}}$ test case.

## Sample Input

```
3
8 2
2 -1 -1 -10 -1 20 -1 3
Jaba
7 2
3 -1 20 -1 -10 -1 2
Pieton
5 1
10 5 -3 6 -2
Jaba
```

## Sample Output

```
19
8
5
```