

# C

## Optimal Segments

**Input:** Standard Input  
**Output:** Standard Output



Consider a grid of size  $1 \times N$ . Each cell of the grid has the following properties

- Cell  $C$  of the grid has a value of  $V_C (1 \leq C \leq N)$
- The value of each cell is a positive integer less than **26**
- Some of the cells are *special* and they are represented with the character **X**
- Cell  $C$  has a weight of  $2^{V_C}$  (two to the power of cell value)
- The special cells have weights of **1**

You will be given the values of these  $N$  cells and your job will be to divide these into  $K$  segments so that

- Each segment contains at least one cell
- There is at least one *special* cell in each segment

The weight of a segment is equal to the product of the weights of the cells it contains. You have to form segments in such a way so that ratio

(Highest weight of all the segments) / (Lowest weight of all the segments) is minimized.

In case there are multiple answers with the same lowest ratio, you have to make sure the number of cells in the first segment is maximized. If there is still a tie, then make sure the number of cells in the second segment is maximized and so on.

### Example:

**N = 5 and K = 2**

**Cell values = {1 2 X 3 X }**

**Cell weights = {2 4 1 8 1 }**

**Optimal segmentation = (2 4 1)(8 1)**

**Weights of segments = (8)(8)**

**Ratio = 1**

**Final Result = (1 2 X)(3 X)**

## Input

The first line of input is an integer  $T (T \leq 200)$  that indicates the number of test cases. Each case starts with two integers  $N (1 < N < 31)$  and  $K (1 < K < 16)$ . The meaning of  $N$  and  $K$  are mentioned above. The next line contains  $N$  integers where the  $I^{\text{th}}$  integer gives the value of  $V_I$ . The integers that are special will be represented by **X**.

## Output

For each case, output the case number first. If there is no way to divide the  $N$  cells into  $K$  segments, meeting the constraints above, then print "**not possible!**" If there is a way but the ratio is greater than  $10^{15}$  then print "**overflow**". If the ratio is not greater than  $10^{15}$  then output the ratio first followed by the segmentations. Each segment is enclosed by brackets. Look at the output for detailed format.

## Sample Input

```
4
5 2
1 2 X 3 X
6 3
X X 2 3 4 5
10 3
X X X 25 25 25 25 25 25
10 3
4 X 3 1 X 3 X X 3 2
```

## Output for Sample Input

```
Case 1: 1 (1 2 X)(3 X)
Case 2: not possible!
Case 3: overflow
Case 4: 8 (4 X 3)(1 X 3 X)(X 3 2)
```

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