

## The Evil Word

You are writing an essay for a notoriously strict professor who believes that certain *words* carry “evil energy.” The professor measures the *evilness* of a word by summing the ASCII values of all characters it contains. A word with a larger total ASCII score is considered more evil.

Formally, for a word  $w$  with characters  $w[1], \dots, w[|w|]$ , its evilness is

$$E(w) = \sum_{i=1}^{|w|} \text{ASCII}(w[i]).$$

The professor’s old text-processing machine does not store the full essay. Instead, it receives the input ***one word at a time***, each word arriving as a stream of characters on a single line. As soon as a word has been fully read, the machine computes its evilness  $E(w)$  and then immediately discards the characters themselves, keeping only a small number of candidate evilness values in memory.

After each new word is processed, the professor wants to know *both*:

- the current ***k-th least evil word***, and
- the current ***k-th most evil word***,

among all words seen so far, according to their evilness scores.

These rankings are computed over the ***multiset of evilness scores***, counting duplicates. If multiple words share the same score, **any** word with the appropriate score is acceptable.

If fewer than  $k$  words have appeared so far, the professor is not satisfied with either query and expects you to output “-” in its place.

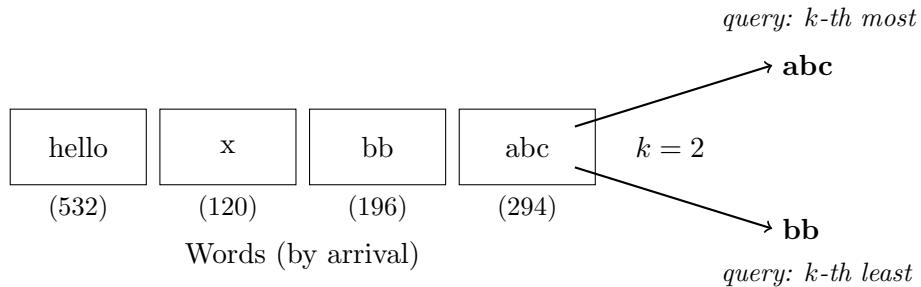


Figure 1: Example with  $k = 2$ : the 2nd least evil word is **bb**, and the 2nd most evil word is **abc**.

## Input

The input begins with a single line containing two integers  $n$  and  $k$ , where

$$1 \leq k \leq n \leq 200\,000.$$

The next  $n$  lines each contain exactly one word, consisting only of printable ASCII characters (codes 33 to 126, from ! to ~). Each line provides the complete stream of characters for that word.

## Output

Output exactly  $n$  lines.

After processing the  $i$ -th word, print two space-separated tokens describing the current  $k$ -th least evil and  $k$ -th most evil words among all words seen so far:

- If fewer than  $k$  words have been processed, print - -.
- Otherwise, print  $L$   $R$ , where  $L$  is any word whose evilness is the  $k$ -th smallest among all scores seen so far, and  $R$  is any word whose evilness is the  $k$ -th largest.

If several words share the same evilness score, any valid choice for  $L$  or  $R$  will be accepted.

## Sample Input/Output

Sample Input 1	Sample Output 1
5 2	- -
hello	hello x
x	bb bb
bb	bb abc
abc	bb wow
wow	

Sample Input 2	Sample Output 2
3 1	abc abc
abc	abc xyz
xyz	a xyz
a	