

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.

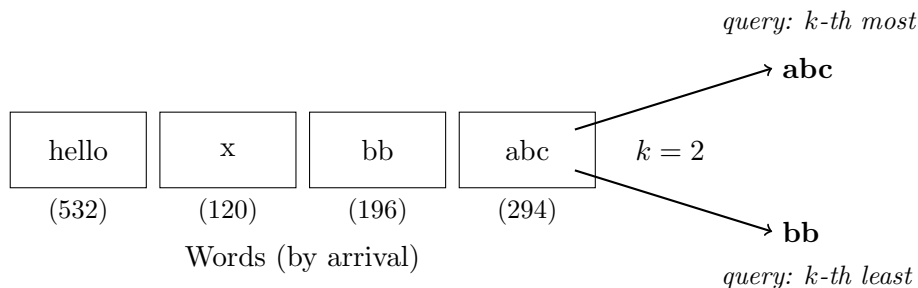


Figure 1: Example with $k = 2$: the 2nd least evil word is **bb**, and the 2nd most evil word is **abc**.

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 x bb abc wow	- - hello x bb bb bb abc bb wow

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