

In this problem, we will input text containing words and output text containing the same words rewrapped so that the words on each line are separated by single blanks and the line lengths are as close to (possibly shorter or longer than) a target width as possible.

Input Format

The first line of input contains a positive number w , which is the target width of the output text. The remaining input contains $n \geq 1$ words $x_1, x_2, x_3, \dots, x_n$ separated by whitespace delimiters. The *delimiter characters* are the blank, horizontal tab, line feed (a.k.a. newline) and carriage return. A *word* is a string of characters not containing delimiter characters. A *whitespace delimiter* is a string of delimiter characters. Note that punctuation is considered part of the word to which it's connected.

Output Format

If a line of output contains successive words $x_l, x_{l+1}, x_{l+2}, \dots, x_r$, then its *length* is

$$\text{length}(l, r) = r - l + \sum_{i=l}^r |x_i|,$$

(since the line contains $r - l$ blanks and $|x_i|$ is the length of x_i), and its *badness* is

$$\text{badness}(l, r) = |w - \text{length}(l, r)|.$$

The *total badness* of the output is the sum of the badness of each line. Output the total badness, followed by successive words $x_1, x_2, x_3, \dots, x_n$ separated by a single blank or a single line feed, such that the total badness is minimized. Hint: the minimum possible total badness $b(k)$ for outputting words $x_1, x_2, x_3, \dots, x_k$ is defined recursively by

$$b(k) = \begin{cases} 0 & \text{if } k = 0 \\ \min_{0 \leq j < k} (b(j) + \text{badness}(j+1, k)) & \text{if } k > 0 \end{cases}$$

Input Sample

```
6
aaa bb, cc dddd e
fff gggg. hh ii?
```

Output Sample

```
total badness: 5

aaa bb,
cc dddd
e fff
gggg.
hh ii?
```