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The 2021 ICPC Central Europe Regional Contest

Practice Session

X – Anagram

Time limit: 4 s Memory limit: 256 MiB

Two words are anagrams if the letters of the first word can be reordered to obtain the second one. An instance of anagrams is the pair “listen” and “silent”.

You are given a list of words, each word consisting of lowercase letters. Your goal is to filter this list by dropping any word whose anagram has already appeared earlier on the list.

Input data

The first line contains n , the length of the list. This is followed by n lines, each containing one word.

Input limits

- $1 \leq n \leq 10^5$
- All letters are lowercase letters of the English alphabet.
- Length of any word will not exceed 100.

Output data

Print out the list of words without anagrams, one word per line. The words should appear in the same order as given in the input.

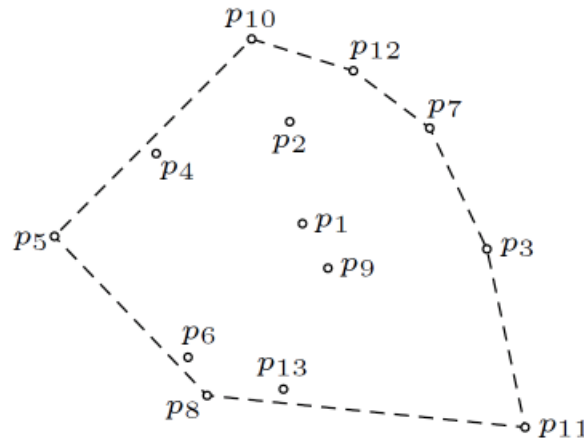
Example

Input	Output
5	listen
listen	santa
santa	cat
satan	
silent	
cat	

Y – E(length(CH))

Time limit: 2 s Memory limit: 256 MiB

You are given n points on a plane. The i -th of them is *activated* with probability p_i , provided as part of the input. Find the expected circumference of the convex hull of all activated points.



Input data

The first line contains the number of points n and the number p^* . All points are activated with the probability $p_i = p^*$, except for the first three, which are always activated ($p_1 = p_2 = p_3 = 1$); this way, the definition of the convex hull circumference is always sound.

This is followed by n lines, each containing space-separated coordinates of the i -th point, x_i, y_i .

Input limits

- $3 \leq n \leq 1000$; $0 \leq p^* \leq 1$
- $0 \leq x_i, y_i \leq 10\,000$; $x_i, y_i \in \mathbb{Z}$
- No three points are colinear. No two points share an x or y coordinate.

Output data

Print out a single number — the expected circumference of the convex hull. Your result should differ by less than 0.001 from the reference solution to be considered correct.

Examples

Input

4 0.281250
6 6
5 8
8 3
7 10

Output

12.816849

Input

5 0.561523
2 11
7 8
13 10
9 9
13 3

Output

27.943471

Z – Robin Hood

Time limit: 3 s Memory limit: 256 MiB

Elders of the village foresee a harsh winter and Robin Hood is worried about the well-being of those less well off. As usual, he will be doing a bit of wealth redistribution in the kingdom, that is, he plans to steal from the rich. He estimates that K heists will be required. However, Robin Hood has a moral codex that determines who the best target is. He always steals from the richest person – if there are several, he will pick the first one on the list. He only steals 100 monetary units at the time and never steals from anybody who would be left with 0 (or less) money after the heist.

You are provided with the information about the wealth of N men and the number of heists, denoted as K . Compute the amount of wealth left after K performed heists according to the described moral codex.

Input data

The first line contains two space-separated integers, N and K . The second line contains N space-separated integers P_i , the wealth of all Robin Hood's targets.

Input limits

- $1 \leq N, K \leq 10^5$
- $1 \leq P_i \leq 10^9$

Output data

Print the amount of wealth after the K thefts, or print `impossible` if Robin Hood cannot perform that many thefts.

Examples

Input	Output
4 2 100 120 250 13	100 120 50 13
4 4 100 120 250 13	impossible
3 4 200 300 300	100 100 200

