A. The Lucky House

Limits: 1 sec., 256 MiB

John has a house with number N. John wants to make his house number lucky. As you probably know a positive integer is called a lucky number if it contains only lucky digits in its decimal representation, and there are only two lucky digits 4 and 7.

A friend of John called Brus can perform one of the following operations:

- Replace digit at any position of the house number with any other digit. The cost of this operation is A.
- Insert any digit at any position of the house number. The cost of the operation is B.
- Remove any digit from the house number. The price is C.

John can ask Brus to perform any sequence of these operations, but he has to pay for each of them. Also after each operation the house number must have at least one digit and the most significant digit should not be zero. You have to find minimal possible total cost of operations needed to get a lucky house number.

Input

The first line contains integer number N. The following line contains three integer numbers A, B and C separated with single spaces.

Output

The only integer which is the minimal possible total cost.

Constraints

$1 \leq N \leq 1000000000(10^9)$,
$1 \leq A, B, C \leq 100$.

Samples

Input (*stdin*)	Output (*stdout*)
`15` `7 4 4`	`11`

Notes

First, John can ask Brus to change 15 into 45 by replacing the first digit and then to change 45 to 4 by removing the last digit.

B. The Marijuana

Limits: 1 sec., 256 MiB

John and Brus have N different types of marijuana. The types are numbered from 1 to N. They are going to plant N stems (one of each type) in a row. A steam of the j-th type of marijuana will grow normally if there are no other stems closer than A_j meters to it. It means no other stems should be planted closer than A_j meters to the left and closer than A_j meters to the right of it.

John and Brus would like to plant the stems in a way to minimize the distance between the first and the last stems in a row. You have to find the sequence of stems which gives the smallest possible distance between the first and the last stems. If there are many such sequences you have to choose lexicographically the smallest one. One sequence is considered to be lexicographically smaller than another if it has smaller term at the first position the sequences differ.

Input

The first line contains integer number N. The following line contains N integers A_1, ..., A_N separated with single spaces.

Output

Print the required sequence of N integers separated with single spaces.

Constraints

$1 \le N \le 100$,
$1 \le A_j \le 100$.

Samples

Input (*stdin*)	Output (*stdout*)
`3` `4 7 5`	`1 3 2`

Notes

The minimal possible distance between the first and the last stems is 12. The sequence 1 2 3 gives us the distance 14 which is greater. Note that sequences 2 1 3, 2 3 1 and 3 1 2 give minimal possible distance as well, but they are lexicographically greater than the sequence 1 3 2.

C. The Football Game Tickets

Limits: 1 sec., 256 MiB

John and Brus have N football game tickets for a Championship Cup. Each ticket is described by the city where the game is held and the seat number. There are four cities in Ukraine where football matches of the tournament are held: Lviv, Kyiv, Donetsk and Kharkiv.

There are many friends of John and Brus who would like to get game tickets. Every time somebody is asking John and Brus for a ticket they randomly pick one and give it away. But if there is the previous given away ticket then John and Brus want to give away a ticket with different seat number (disregarding the cities). Thus they will randomly choose a ticket among all the tickets with different seat numbers (comparing to the seat number of the previous given away ticket). If there are no such tickets they will simply stop giving away tickets and keep the rest of them. You have to find the expected number of tickets John and Brus will keep.

Input

The first line contains integer number N. Each of the following N lines contains ticket description in a form of C_jS_j, where C_j is the city and S_j is the seat of the j-th ticket.

Output

The only number which is the expected number of tickets John and Brus will keep with absolute or relative error not exceeding 10^{-4}.

Constraints

$1 \leq N \leq 100$,
C_j is one of `Lviv`, `Kyiv`, `Donetsk`, `Kharkiv`,
$1 \leq S_j \leq 10000$,
all pairs (C_j, S_j) are distinct.

Samples

Input (*stdin*)	Output (*stdout*)

`4`
`Kyiv 4`
`Lviv 7`
`Kharkiv 4`
`Donetsk 4`
	`1.25`

Notes

If they give away the ticket to the game in Lviv first, then they will keep two tickets, otherwise there will be just one.

D. The Awesome Numbers

Limits: 1 sec., 256 MiB

John and Brus believe that a positive integer number is awesome if all its digits are sorted in non-descending order from the most significant to the least significant digit. For example, integers 111, 47 and 123456789 are awesome but 10, 74 and 46798 are not. You have to find the K-th awesome number.

Input

The only integer number K.

Output

The K-th awesome number.

Constraints

$1 \leq K \leq 1000000000(10^9)$.

Samples

Input (*stdin*)	Output (*stdout*)
47	68

Notes

The first 47 awesome numbers are: 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27, 28, 29, 33, 34, 35, 36, 37, 38, 39, 44, 45, 46, 47, 48, 49, 55, 56, 57, 58, 59, 66, 67, 68.

E. The Pointless Game

Limits: 1 sec., 256 MiB

John and Brus are playing a pointless game on an N by M chessboard. John has one while pawn and Brus has one black pawn. Initially they are located in cells (RJ, CJ) and (RB, CB) respectively. The rows of the board are numbered from 1 to N and the columns are numbered from 1 to M.

While making a move a player moves his pawn by one cell in one of the four diagonal directions: northwestern, northeastern, southwestern or southeastern. A player wins a game if after his move both pawns are located on the same board cell.

John moves first and both players are using optimal game strategy, i.e. if a player can win he will minimize the total game moves, otherwise he will maximize it. You have to determine the game outcome.

Input

The first line contains two integers N and M separated with a single space. The following line contains four integers RJ, CJ, RB and CB separated with single spaces.

Output

If John wins, print a line `John X`. If Brus wins, print `Brus X`. Otherwise the game is endless and you have to print `Draw` instead. Here X is the total number of game moves, i.e. the number of John's moves plus number of Brus's moves.

Constraints

$2 \le N, M \le 1000000000(10^9)$,
$1 \le RJ, RB \le N$,
$1 \le CJ, CB \le M$,
(RJ, CJ) and (RB, CB) are different.

Samples

Input (*stdin*)	Output (*stdout*)
`4 5` `4 2 2 4`	`Brus 4`

Notes

At the beginning of the game John has two options. If he moves to (3, 3), then he will lose after the next move of Brus. Otherwise he moves to (3, 1), then Brus can move to (3, 3) and guarantee his victory after the next his move.

F. The Manhattan

Limits: 1 sec., 256 MiB

John and Brus are in Manhattan. They are looking for the girl they met on their way to Manhattan. Each of them can get from the block (x_1, y_1) to the block (x_2, y_2) in $|x_1 - x_2| + |y_1 - y_2|$ minutes. Initially John is located in the block (XJ, YJ) and Brus is located in the block (XB, YB).

John and Brus both know that the girl they are looking for is in one of the N blocks. More precisely, the probabilities she is in for all the blocks are equal, i.e. $1/N$. Each of the boys is using pretty straightforward strategy of searching a girl. Every time one of them has to decide where to go, he will randomly choose one of the potential blocks he hasn't been to before. Then he will go there to check if there is the girl. The boys are acting separately and since each of them would like to find the girl first they don't share the knowledge if they meet.

Basically, there are three possible outcomes of this story. Either John finds the girls first, or Brus finds the girl first or they find her simultaneously. You have to calculate the probabilities for each of the outcomes.

Input

The first line contains integer number N. The second line contains two integers XJ and YJ separated by a single space. The next line contains two integers XB and YB separated by a single space. Each of the following N lines contains two integers X_j and Y_j separated by a single space. Here (X_j, Y_j) is the j-th potential block where the girl could be.

Output

Print three lines containing probabilities that John finds the girl first, Brus finds the girls first and they find her together at the same time, respectively. Each probability should be printed as irreducible fraction in a form a/b, where a is a nonnegative integer and b is a positive integer.

Constraints

$1 \le N \le 10$,
$1 \le XJ, YJ, XB, YB, X_j, Y_j \le 100$,
all the blocks given in input are distinct.

Samples

Input (*stdin*)	Output (*stdout*)

`2`
`1 1`
`9 3`
`4 5`
`7 3`
	`1/8`
	`1/2`
	`3/8`

G. The Darts

Limits: 1 sec., 256 MiB

John has a perfect darts game skill. He can hit any dartboard sector he wish. Thus with one throw he can gain 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 30, 32, 33, 34, 36, 38, 39, 40, 42, 45, 48, 50, 51, 54, 57 or 60 points.

Brus was wondering how many throws John needs to get exactly N points as a sum.

Input

The only integer number N.

Output

The only integer which is the minimal number of throws John need to get the total of N points.

Constraints

$1 \le N \le 1000000000 (10^9)$.

Samples

Input (*stdin*)	Output (*stdout*)
29	2

Notes

For example, John can hit the sector 20 with the first dart and the sector 9 with another one.