Rahul is in need of an educational loan and hence visits a bank. The bank can give a loan to Rahul provided he pays the simple interest to the loan amount.

For the given Principle (P), Tenure (T) in years and Rate of Interest (R) in percentage, write a program to find the simple interest.

The formula for calculating simple interest is as below

$$\frac{(P * T * R)}{100}$$

Input

The input consists of a single line of natural numbers separated by spaces. The principle, tenure and interest are specified in sequence in the single line.

Output

The output should consist of a single line specifying the simple interest. Truncate your output to maximum of 2 decimal places.

Constraints

$0 < P <= 10^6$

$0 < R, T <= 10^2$

Sample Input #1

```
2000 5 12
```

Sample Output #1

```
1200.00
```

Sample Input #2

```
2680 7 12
```

Sample Output #2

```
2251.20
```

Government of India (GOI) has approved, the proposal to open a sewage treatment plant in the modern cities of India. The main constraint from the GOI is that frequent rain should not disrupt the sewage treatment functionality of the city. The sewage network should be operational 24x7 throughout the year.

The solution proposed by the state of Karnataka and accepted by the GOI is to build redundant (backup) sewage connections from each sewage treatment plant to every other treatment plant present in the city.

For example in below geographic positions of sewage treatment plant, Government requires in total 10 connections to make the sewage treatment functionality of the city always operational. This redundant sewage plants connections are to be used when the operational sewage plant connections are blocked due some issues.

Given the number of sewage plants in the city find out how many connections needs to be built between the sewage plants. A formula for the number of possible connections can be written as $N*(N-1)/2$ where N is the number of sewage treatment plants.

Input

One line of input contains one integer (N) indicating the number of sewage treatment plants present in the city

Output

One line of output with one integer indicating how many connections are needed between sewage treatment plants
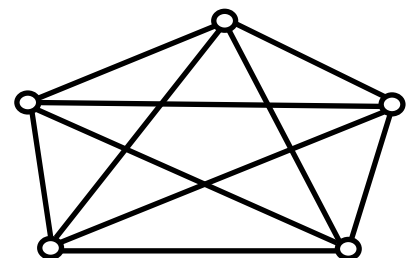
Constraints

$0 < N <= 10^4$

Sample Input #1

5

Sample Output #1

10

Sample Input #2

4

Sample Output #2

6

Tai Lung the dreaded leopard, is imprisoned in the highly fortified Chorh-Gom prison that has 'N' number of walls each of height 'H' meters. The highly skillful Tai Lung can jump across very high walls. But the walls of the Chorh-Gom prison are slippery. So for every 'J' meters of the wall that Tai Lung jumps, he slips back by 'S' meters.

Also, the distance between any two walls is such that he has to jump from the ground each time he clears a wall.

The Chorh-Gom prison officials wish to understand if the existing infrastructure is sufficient to prevent Tai Lung from escaping. Your task is to come up with a program to find the total number of jumps that Tai Lung has to make in order to escape.

Input

The first line of the input has two values, J and S in meters. The second line has two or more inputs, the first one, N, gives the number of walls to jump. This is followed by the height, H, of each wall (each separated by a whitespace).

Output

The number of jumps for Tai Lung to escape. If Tai Lung cannot escape, the program should print –1.

Constraints

$0 <= J, S, N, H <= 10^3$

Sample Input #1

```
10 1
1 10
```

Sample Output #1

```
1
```

Sample Input #2

```
5 1
2 9 10
```

Sample Output #2

```
5
```

Ramesh is in-charge of a large tea plantation that employs many laborers. He has to plan the daily wages budget for the laborers. He asks his friend, Suresh, an ace programmer, to help him find the number of days in any given month and a given year so that he can then calculate the daily wages that need to be spent on that day.

For example, if Ramesh wants to know the number of Tuesdays in the month of May 2018, Suresh's program answers 5. If Ramesh wants to know the number of Sundays in June 2018, then the program gives the answer 4. Similarly if Ramesh wants to know the number of Fridays in the month of December 2017 the program gives the answer 5.

You, as Suresh, are required to write a program for this.

Input
One line containing the Month, Year and the Day each separated by a whitespace.

Output
The number of days in the given month and year.

Constraints
Date range: 1st of JANUARY 1970 to the 31st of DECEMBER 2100.

Sample Input #1
```
MAY 2018 TUESDAY
```

Sample Output #1
```
5
```

Sample Input #2
```
JUNE 2018 SUNDAY
```

Sample Output #2
```
4
```

The 3-card game is where each player gets a set of 3 cards from a standard 52-card deck. The standard 52-card deck contains card names ACE (A), 2, 3, 4, 5, 6, 7, 8, 9, 10, JACK (J), QUEEN (Q), and KING (K) with card symbols CLUBS (C), DIAMONDS (D), HEARTS (H) and SPADES (S). Players place bets on their 3 cards and the player that has the highest set of cards wins.

The below is the order of win:

- Refer the diagram for the guidelines to determine the winning hand (Priority Sequence is Left to Right and Top to Bottom)
  - o For example, Trail or Set (three of same rank) has the highest rank than Pure Sequence which has highest rank than Sequence (run) and so on.
- The priority sequence of the card symbol is CLUBs, DIAMONDs, HEARTs and SPADEs. i.e., a player having card 2 of CLUBs wins over a player having card 2 of DIAMONDs.
- Keep in mind the order of cards in *sequence* and *pure sequence*. [A, K, Q] > [A, 2, 3] > [K, Q, J]
- Ensure proper error handling for invalid input combinations by printing "INVALID INPUT"

Highest hand wins. Ranking from high to low is:
1. Trail or Set (three of same rank)
2. Pure Sequence
3. Sequence (run)
4. Color
5. Pair (two cards of same rank)
6. High Card

Input

The first line consists of one integer T denoting the number of players.

T subsequent lines contain a set of 3 cards that a player has in his/her hand separated by a whitespace.

Each Card is represented as card symbol followed by the card name.

Example – CA represent ACE (A) of CLUBs (C), and so on.

Output

Print the cards in the hand of the winning player in the same input order

Constraints

$2 <= T <= 17$

Sample Input #1	Sample Output #1	Sample Input #2	Sample Output #2
4	CA DJ SK	2	CA H2 S3
CA DJ SK		CK HQ SJ	
H2 HJ SQ		CA H2 S3	
C2 H5 S7			
DA H3 S6			
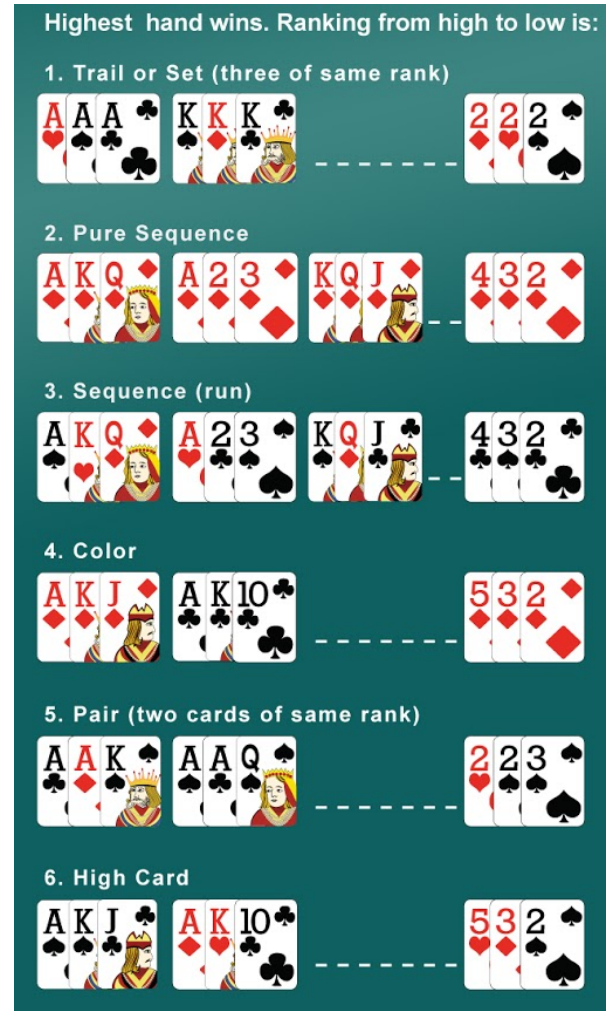
The assembly code has the following instructions that need to be converted to byte code.

Instructions and their respective machine code:

Instruction	Opcode	Format
BASE : Define base address	10	BASE value
ADD : Add one value to register	20	ADD Register value
ADD: Add two registers	40	ADD Register Register
STA : Store to address	50	STA [address] value
LDR : Load from register	60	LDR Register value
LDA : Load from address	70	LDA [address] value
STR : Store to register	80	STR Register value
IF : Conditional jumps	90	IF Register value
GOTO: Unconditional Jump	A0	GOTO labelName
LABEL: Define labels		LABEL labelName

Registers:

Register	Index
R1	00
R2	01
R3	02

Assembler has the job of converting any instruction to its corresponding Byte Code. For this assembler uses some rules which are:

Instruction of type : INSTRUCTION VALUE

BASE HEXVAL : ByteCode = Opcode HEXVAL. This HEXVAL is to be used as base address for the instruction using relative addressing. ***There can be at most only one BASE instruction in the whole program.***

LABEL STRINGVAL: No bytecode is generated for this instruction. It is used only to define a label. The label name will be associated with the corresponding line number.

GOTO STRINGVAL: Bytecode = Opcode LabelVal. Here LabelVal is the value associated with the STRINGVAL using LABEL instruction.

Instruction of type : INSTRUCTION REGISTER VALUE

STR, LDR, ADD, IF : ByteCode = (opcode + registerIndex) value

Instruction of type: INSTRUCTION REGISTER REGISTER

ADD Register1 Register2: ByteCode = (opcode + registerIndex of register 1) registerIndex of register 2

Instructions of type : INSTRUCTION HEXVAL1 HEXVAL2

STA, LDA : ByteCode = opcode [HEXVAL1+BASEADDRESS] HEXVAL2

BASEADDRESS comes from the **BASE** instruction.

Assembly	Byte	Example Assembly	Example Byte code
LABEL x	Null	LABEL start	Null #
STR R1 x	40 x	STR R1 20	80 20
STR R2 x	41 x	STR R2 21	81 21
STR R3 x	42 x	STR R3 22	82 22
STA x y	50 [x+baseAdd] y	STA 3 40	50 60 40 ***
BASE x	10 x	BASE 5d	10 5d**
GOTO label	A0 x	GOTO start	A0 00 *
LDR R1 x	61 x	LDR R1 20	61 20
LDR R2 x	62 x	LDR R2 21	62 21
LDA x y	70 [x+baseAdd] y	LDA 0a 22	70 67 22 ***
ADD R2 RX	41 RX	ADD R2 R3	41 02
ADD R3 x	22 x	ADD R3 23	22 23
IF R3 x	92 x	IF R3 30	92 30

* If the label **start** is defined at the first line of the program then its value will be 0

** baseAdd is assigned a value 5d

*** x+baseAdd = 3+5d = 60 and 0a + 5d = 67

start is assigned a value as 0 considering the label is declared on the first line for the input program

Write a program to perform the functionalities of the assembler described above.

The input is number of lines and statements. Values of x can be in hexadecimal number between 00 to FF. Output needs to be in one line and byte code.

Input

The first line consists of one integer N denoting the number of lines of code.

The subsequent N line contains an assembly code each.

Output

Output should be one line, space separated byte codes for the input program

Sample Input #1

```
13
LABEL START
STR R1 20
STR R2 21
STR R3 22
STA 3 40
BASE 5d
GOTO START
LDR R1 20
```

```
LDR R2 21
LDA 0A 22
ADD R2 R3
ADD R3 23
IF R3 30
```

Sample Output #1

80 20 81 21 82 22 50 60 40 10 5D A0 00 60 20 61 21 70 67 22 41 02 22 23 92 30

Sample Input #2

```
15
STR R1 5F
LABEL DANCE
STR R3 22
STA 5 6E
BASE 7A
GOTO HELP
LDR R1 20
LDR R2 21
STR R2 21
ADD R2 R3
ADD R3 23
LABEL HELP
IF R1 30
LDA FF 31
GOTO DANCE
```

Sample Output #2

80 5F 82 22 50 7F 6E 10 7A A0 0B 60 20 61 21 81 21 41 02 22 23 90 30 70 179 31 A0 01

Major Vikram has to cross an enemy minefield to reach his destination. The minefield is an $M*M$ grid which contains N number of arbitrarily placed landmines. The location of each of these land mines are depicted as a Cartesian co-ordinate pair $(\mathbf{x}, \mathbf{y})$. If Major Vikram steps on the landmine, the mine explodes and

he dies. Can you write a program that can predict if Major Vikram survives the minefield crossing given his travel path through the minefield? Assume that the top left corner of the grid, from where Major Vikram starts, as $(0, 0)$

Major Vikram's travel path is descried as follows: **R - Right, L - Left, U - Up, D - Down.**

If Major Vikram survives the minefield crossing for a given path, your program should output "ALIVE" else if he steps on a landmine he dies and your program should output "DEAD". If the path leads him out of the field then output of the program should be "INVALID".

Input

The first line specifies the Grid Size $M.$ The second line specifies the number of Landmines $N.$ Subsequent N lines which contain coordinates $\mathbf{x}$ and $\mathbf{y}$ for each landmine separated by a space. The last line specifies the travel path.
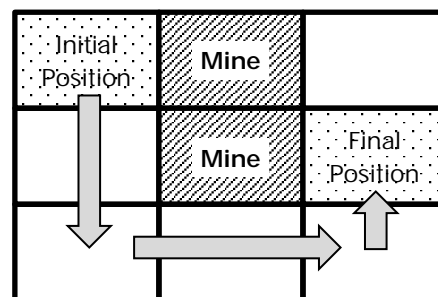
Output

Single String "DEAD" or "ALIVE" or "INVALID" (Quotes are for Clarity only)

Constraints

$1 < M <= 10^6$
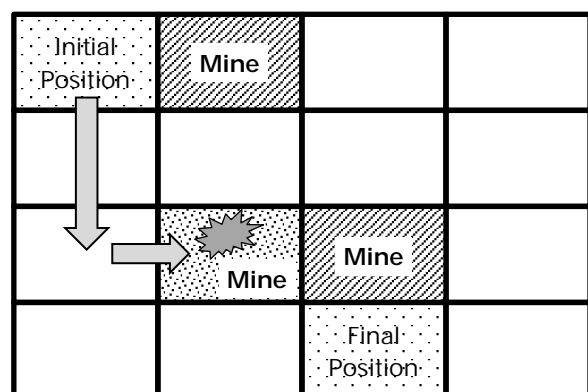
Sample Input #1

```
3
2
0 1
1 1
DDRRU
```


Sample Output #1

```
ALIVE
```

Sample Input #2

```
4
3
0 1
2 1
2 2
DDRDR
```


Sample Output #2

```
DEAD
```

Fantasy League is a game where in every participant chooses a set of players for his/her virtual team corresponding to the game being played in real. After a Real game is played each player is awarded with some points in accordance with his/her performance in the match. There are points for batting and

bowling, the fantasy team with the most points wins. Simple, isn't it? Yes. It's quite easy to play.

Rules for calculating points are as below:

Batting Points

Base Score	1 point per run
Impact Score	-10 point for duck
Milestone Score	10 points(extra) per 25 runs scored
Strike Rate Score	10 points(extra) if the Batsmen's Strike Rate is equal to or more than 100 else -10 points (Strike Rate is defined as , Runs Scored by the Batsmen if he/she continues to play in the similar way for 100 balls)

Bowling Points

Base Score	20 points for first wicket
Impact Score	-10 point if 0 wicket provided has bowled at least 1 legitimate delivery
Milestone Score	10 points for 2nd wicket and subsequent wickets

Bonus points

From the team selected by the Participants, a player scoring less score than the team's average score will reduce the teams overall points by 15, similarly will increase the teams overall points by 15 if his/her score is equal or more than the teams average score

Input

First line denotes the maximum number of players (N) available for Fantasy Team and number of players (M) to be chosen in a team for that match

This is followed by N lines, each line contains Name of the Player, Runs Scored, Balls faced while Batting, Wickets Taken, Number of Balls Bowled (each separated by a void space) for all the players

This is followed by 2 lines for Participants (1 each) to choose M players for his team

Output

The output must be one line containing the fantasy Team Number i.e. "FANTASY TEAM ONE" or "FANTASY TEAM TWO" or "DRAW" (if same points) (Quotes are for clarity).

Constraints

$0 < M, N <= 10^6$

Sample Input #1

```
5 2
Rohit 20 15 2 10
Narine 0 1 5 20
```

```
Virat 10 10 0 0
Hardik 15 14 1 6
Dhoni 50 56 0 0
Rohit Narine
Hardik Dhoni
```

Sample Output #1

```
FANTASY TEAM TWO
```

Sample Input #2

```
5 3
Rohit 20 15 2 10
Yuvraj 0 1 5 20
Virat 10 10 0 0
Narine 15 14 1 6
Dhoni 50 56 0 0
Rohit Narine Dhoni
Virat Dhoni Yuvraj
```

Sample Output #2

```
FANTASY TEAM ONE
```

A builder has several tracts of circularly shaped land each of different radius. He instructs his architect to come up with a building design so that the land usage of each tract is maximized. The architect decides to construct buildings in the shape of regular polygons each of N sides for every tract of land. Having decided the number of sides, N, of each regular polygon for a given land, he wishes to find the area of regular polygon in order to check if the area is maximized. He approaches you to come up with a program that helps him calculate the area of the regular polygon using the number of sides N.

Write a program that helps him calculate the area. You may assume the length of each side to be of unit length. The output area is to be rounded to the nearest two decimal points.

Input
Number of sides, N, each of unit length.

Output
Area in sq. units. Truncate your output to maximum of 2 decimal places.

Constraints
$0 < N < 10^3$

Sample Input #1
4

Sample Output #1
1.00

Sample Input #2
6

Sample Output #2
2.60

An apparatus exists consisting of two tubes where in the left side of the apparatus has a non-transparent (opaque) tube and the right side has a transparent tube. The non-transparent tube has a closed end on the left side. The transparent tube has a closed end on the right side. (see below image).

The non-transparent tube has N number of balls preloaded. A piston on the closed end of the non-transparent tube exists. When this piston is triggered a ball from the non-transparent tube moves to the transparent tube.
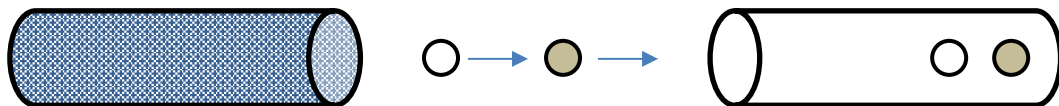
There are certain properties of the non-transparent tube.

If a BLACK ball comes out of the non-transparent tube then all the remaining balls invert their colors. That is when a BLACK ball comes out all the remaining BLACK balls becomes WHITE and all remaining WHITE ball becomes BLACK in the non-transparent tube.

If a WHITE ball comes out of the non-transparent tube then nothing happens to the remaining balls

There is no impact on the color of balls in transparent tube.

Consider the scenario where in a person presses the piston of a preloaded non-transparent tube continuously until it becomes empty. Now the transparent tube is filled with black & white balls.

The below table explains how the transparent tube fills up when the non-transparent tube contains the sequence of balls as `WBBW`.

Non-transparent tube	Transparent tube	Remaining balls after the piston is fired	Explanation
WBB<u>W</u>	<u>W</u>	WBB	As a white ball is fired the remaining balls do not change color.
WB<u>B</u>	<u>B</u>W	BW	As a black ball is fired the remaining balls change their color
B<u>W</u>	<u>W</u>BW	B	As a white ball is fired the remaining balls do not change color.
<u>B</u>	<u>B</u>WBW		As no balls are remaining in the tube, nothing changes.

Given the sequence of the balls in the transparent tube, write a program that can find out the sequence of the balls with their original color in non-transparent tube before the piston was fired once.

Input

The input consists of a single line representing the sequence of the balls in the transparent tube.

Output

The output should consist of a single line that represents the sequence of the balls in the non-transparent tube before firing the piston once.

Constraints

$0 < N < 10^3$

Sample Input #1

```
BWBW
```

Sample Output #1

```
WBBW
```

Sample Input #2

```
BWWBW
```

Sample Output #2

```
WBBBW
```

Gabbar wishes to kill Thakur Baldev Singh (a.k.a. Thakur). The Thakur is hiding in a fortified maze comprising of Iron and Brick Walls which can be present anywhere in the maze. Each brick wall can be demolished using a single grenade whereas the iron walls are indestructible.

Gabbar has P number of grenades with him to demolish the brick walls in his quest to kill the Thakur, who is hiding at an arbitrary point in the maze. Given the maze of size $M*N$, your job is to write a program that can tell whether Gabbar can reach the Thakur or not. If he catches the Thakur, your program should print the number of grenades remaining followed by "YEH HAATH MUJHE DEDE THAKUR!!!" (Separated by a white space) else "BACH GAYA THAKUR!!!" If multiple paths are available, your program should choose the path which uses least number of grenades.

Nomenclature used for this maze is as shown in the right.

1	2	3	4	5
10	9	8	7	6
11	12	13	14	15
20	19	18	17	16
21	22	23	24	25

Input

The first line of the input corresponds to the size of the maze M, N separated by a space

Following line contains a single integer X denoting the number of Brick walls followed by X integers which denote the location of Brick walls in the Maze, each separated by a white space.

The next line contains a single integer Y denoting number of the Iron walls followed by Y integers which denote the location of Iron walls in the Maze, each separated by a white space.

The next line contains two Integers denoting the initial location of Gabbar and Thakur separated by a space.

The last line contains the number of grenades, P, which Gabbar has before he starts his quest.

Output

The number of grenades left with Gabbar if he is successful in locating Thakur followed by "YEH HAATH MUJHE DEDE THAKUR!!!" separated by a white space (the quotes are for clarity only and should not be present in the output).

If Gabbar cannot reach Thakur's location, your program should print "BACH GAYA THAKUR!!!" (The quotes are for clarity only and should not be added in the output).
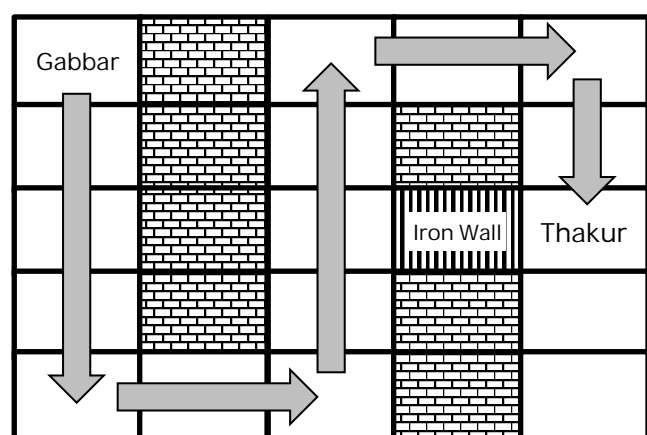
Constraints
$0 < M, N <= 10^6$

$0 < X, Y, P <= 10^2$

Sample Input #1
5 5

7 2 7 9 12 17 19 24

1 14

1 15

3

Sample Output #1

```
3 YEH HAATH MUJHE DEDE THAKUR!!!
```

Sample Input #2

```
5 5
13 2 4 6 9 12 13 14 16 17 19 20 22 24
1 8
1 15
2
```
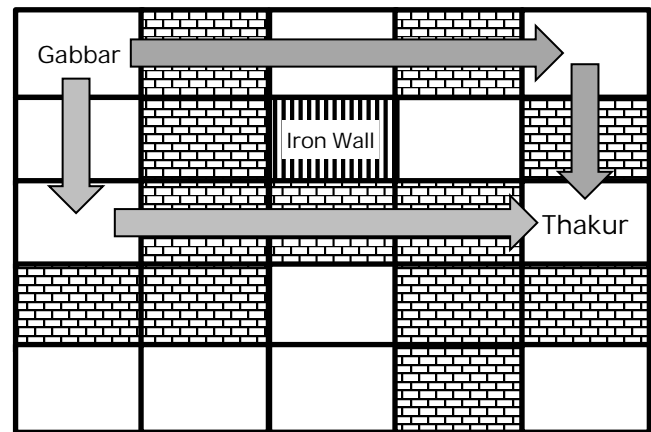
Sample Output #2

```
BACH GAYA THAKUR!!!
```

An IT Company based in Bangalore has N employees having unique ID numbers from 1 to N. The Managing director's ID is 1. Every employee in the company has *exactly one* immediate supervisor except the director, who has no supervisor. The company's employee hierarchy forms a tree of employee IDs that's rooted at employee number 1(the MD).

The Managing director decides to have a retreat lasting M days at Taj Vivanta. Each day, the employees will be assigned to different groups for team building exercises. Groups are constructed in the following way:

An employee can invite their immediate supervisor (the director has no supervisor and, thus, doesn't invite anyone). If employee X is invited by employee Y, then X and Y are considered to be in the same group.

Once an employee is invited to be in a group, they are in that group. This means that if two employees have the same immediate supervisor, only one of them can invite that supervisor to be in their group.

Every employee must be in a group, even if they are the only employee in it. Employees cannot be in multiple groups at the same time.

Remember that more than one employee can be reporting to a supervisor.

Taj Vivanta has different pricing for each of the M days of the retreat. For each day j, there is a cost of C_j India Rupees per group and a per-group size limit of P_j (i.e., the maximum number of people that can be in any group on that day).

Help the director find optimal groupings for each day so the cost of the M-day retreat is minimal, then print the total cost of the retreat.

Input

The first line contains two space-separated integers denoting the respective values of N (the number of employees) and M (the retreat's duration in days).

The next line contains N-1 space-separated integers where each integer I denotes E_i ($1 < I <= N$), which is the ID number of employee i's direct supervisor.

Each line j of the M subsequent lines contain two space-separated integers describing the respective values of C_j (the cost per group in Indian Rupees) and P_j (the maximum number of people per group) for the jth day of the retreat.

Output

Integer denoting the minimum total cost for the M-day retreat.

Constraints

$1 < N, M <= 10^2$

$1 < E_i, P_j <= 10^2$

$1 < C_j <= 10^6$

Explanation of Sample Input #1

The company has 7 employees and the retreat goes on for 3 days. The hierarchy looks like as show in the right.

On the first day, the cost per group is 5000 Indian Rupees and each group has a maximum size of 3. The employees split into the following three groups:

- Employee 6 invites their manager, employee 2. Employee 2 then invites their manager, employee 1 (the director).
- Employee 5 invites their manager, employee 4. Employee 4 then invites their manager, employee 3.
- Employee 7's manager is already in another group, so the employee is in a group by himself.

These groupings are demonstrated in the following image where each group has a different pattern:

In other words, the final groups are {1, 2, 6}, {3, 4, 5} and {7}. This means the total cost for the first day is groups * cost = 3 * 5000 = 15000 rupees.

On the second day, they split into 4 groups with a maximum size of 2 at a total cost of 24000 rupees.

On the third day, they split into 7 groups of size 1 at a total cost of 7000 rupees. When we sum the costs for all three days, we get 15000 + 24000 + 7000 = 46000 rupees as our answer.

Sample Input #1
```
7 3
1 1 3 4 2 4
5000 3
6000 2
1000 1
```
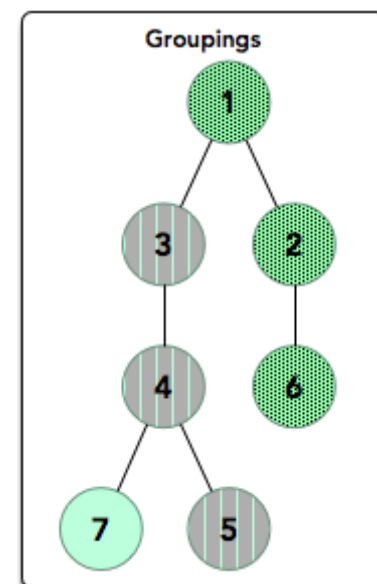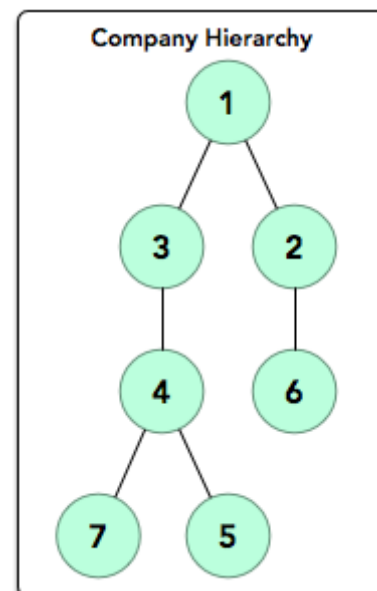
Sample Output #1
```
46000
```

Sample Input #2
```
9 4
1 1 2 3 5 5 3 4
1000 3
2000 2
3000 1
4000 2
```

Sample Output #2
```
61000
```

Rahul leaves his home at 9 AM to attend a business meeting in the office. Meeting is going to start sometime after 9 AM and he needs to reach office on or just before meeting time. From the nearest bus stop, he can ride any bus to his office. The time taken to reach the office varies depending on the bus route and the number of

stops that bus makes. He needs to select a bus route that allows him to reach the office on or just before meeting time.

Given a set of bus routes available from the bus stop near Rahul's home, can you help him to select a bus route that will allow him to meet above requirement?

Input

First line contains one integer T indicating the number of minutes to the meeting from 9 AM.

The second line contains one integer R indicating number of bus routes available from Rahul's home to his office.

R subsequent lines contain bus route name N, number of bus stops S in the route and S time duration D between stops, separated by white spaces.

Output

Output the name of the bus route Rahul should take to reach the office on or just before meeting time. If no such bus route is available output as "No Bus Route Found".

Constraints

$0 < R <= 10^5$

$0 < S, D <= 10^2$

Wait time at each bus stop is zero.

Sample Input #1
```
40
4
A 3 20 10 15
B 5 11 12 4 3 9
C 4 10 3 2 21
D 6 5 4 13 11 20 2
```

Sample Output #1
```
B
```

Sample Input #2
```
55
3
I95 2 55 02
I35 3 51 01 01
I10 11 45 01 01 01 01 01 01 01 01 01 01
```

Sample Output #2
```
I10
```

A newspaper company prints advertisements and charges their customer based on the number of words. For each un-styled word 'W' they charge a base price of 'X' Rupees. If the word is made bold, then a surcharge of 30% on the base price is charged. If a word is underlined, then a surcharge of 20% on the base price is charged.

If a background color is used, the surcharge of 100% on the base price is charged. Note that any word in the advertisement can be bold, underlined, have a background color, or any combination of the three. Anything can be considered as a word if it is separated from other text by one or more whitespaces.

Write a program to calculate the cost of the advertisement given the text.

Input

The first line of input contains an integer, denoting the base price 'X' per word.

The next line contains the advertisement text. Any words specified between and is considered as bold. Any words specified between <u> and </u> is considered underlined. Any words between <bg> and </bg> is considered to have a different background color. There can be any number of instances of <b>, <bg>, <u> and program has to capture all matches. The tags should not be considered as words.

Output

A single integer denoting the cost of the advertisement.

Constraints

$0 < W, X <= 500$

Sample Input #1

```
10
```

```
<bg>EAST  Bangalore/Whitefield.  Rs.  12,000/-  per  month.</bg>  Beautiful  1BHK.
Newly<u> renovated.</u> Walk-in pantry. Hot water included. No Fee. View pics at
www.website.com. Call Agent 98564 78987.
```

Sample Output #1

```
312
```

Sample Input #2

```
15
```

```
Required: Accountant having experience of at least 3-5 years, <u>well versed with
<b>Tally</b>, accountancy & Taxation.</u> Interested candidates may send their
resume to Interview between 11 AM to 5 PM on 23rd, 24th & 25th Nov 2017
```

Sample Output #2

```
580
```

Vivek's father owns a whole sale wheat shop in your neighborhood. He sells N kg of wheat for different prices based on the quantity being sold. Minimum quantity of wheat he sells is 1 kg. Let's say he has 8 Kg of wheat and price list is as follows

Weight (Kg)	1	2	3	4	5	6	7	8
Price (Rupees)	1	5	8	9	10	17	17	20

If he sells the 8 kg wheat as whole he would earn 20 Rupees. If he sells 1 Kg to 8 different people he would earn 8*1= 8 Rupees. But if he sells it as 2 Kg and 6 Kg, he would earn 5 + 17 = 22 Rupees which is the maximum profit he can make from the above example.

Can you help Vivek's father find the maximum profit possible from selling the wheat by writing a program, given the amount of wheat to sell and the price list? Note that the output should be maximum profit.

Input

The first line contains an integer N, denoting the number of kg of wheat to sell.

The second line contains a list of integers separated by spaces, representing the price list from 1 to N kg.

Output

Maximum profit which can be obtained by selling the N kg wheat.

Constraints

$1 <= N <= 10^6$

Sample Input #1

```
10
1 4 5 7 8 21 21 23 24 25
```

Sample Output #1

```
29
```

Sample Input #2

```
15
10 10 15 10 10 12 12 11 14 11 12 13 13 12 12
```

Sample Output #2

```
150
```

Every year the Karnataka Government gets proposals to set up companies from entrepreneurs in the 4 different regions (East, West, North, and South) of Bangalore.

The Karnataka Govt. receives an estimated pollution index from each company. The pollution index is the estimated as cubic volume of hazardous gas released by the company per year. Additionally, the Karnataka Government calculates pollution index for the four regions in Bangalore. The pollution index of a region is calculated by adding up the pollution indices of all of the companies in that region. There are thresholds for the pollution indices of the regions, which are assigned by the pollution control board.

You have to fit the maximum number of new companies in each region (assume that there are no companies already polluting in the regions), keeping the total pollution index in each region at a minimum, while still ensuring that the pollution index for the region is still within its threshold.

Input

First line contains the pollution index thresholds for all the four regions in the order East (E), west (W), North (N), South (S).

In the next four lines, the first integer of each line is the number of companies proposed in the region (First line is for East region, second for West, third for North and fourth for South). On each line, the integers following the first integer represent the estimated pollution index for each proposed company in the region.

Output

In each line, print the number of companies chosen for that region, followed by their pollution indexes sorted in ascending order. First row should indicate the pollution indices for the companies that can be opened in East Bangalore region and similarly the other three lines should output for West, North and South respectively.

Constraints

$0 < E, W, N, S <= 10^9$

$0 < N <= 10^3$

Sample Input #1
```
450 560 350 400
6 100 150 50 90 180 30
6 200 190 150 90 80 30
6 60 100 170 90 80 130
6 70 80 150 190 180 40
```

Sample Input #2
```
750 210 150 300
5 950 1150 1050 1100 1000
5 100 250 175 200 300
5 10 20 30 40 50
5 100 150 50 90 30
```

Sample Output #1
```
5 30 50 90 100 150
5 30 80 90 150 190
4 60 80 90 100
4 40 80 70 150
```

Sample Output #2
```
0
1 100
5 10 20 30 40 50
4 30 50 90 100
```

There is a summer camp happening at a campus for school students of age 4 to 17 years.

The activity master at the camp is planning for a Rope walking activity for kids of age group 6 to 15 years. He instructed the kids to form a queue based on the order of their name, age and then ID. First condition is dictionary order of first names, second condition is age and third condition is ID number. Since this is a very interesting activity, all kids in the camp are trying to get into the queue.

All the kids started asking each other about their names and ages so as to form an order. Due to large audience, the school teacher who has been to the camp along with kids, felt it would be nice if we could feed the first names and ages along with the ID numbers to a program which in return will display the complete ordered list of IDs which satisfies the above conditions.

Input

The first line of input contains an integer N, denoting the total number of kids in the camp.

Next N lines provides details of kid's First name, Age and ID number separated by a white space.

Output

Print the ordered list of IDs with space between IDs matching the above criteria.

Constraints

$1 < N, ID <= 10^2$

Sample Input #1

```
6
A 8 1
A 6 2
AB 8 3
D 5 4
B 10 9
B 10 5
```

Sample Output #1

```
2 1 3 5 9
```
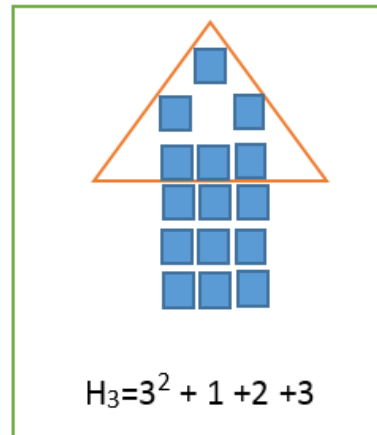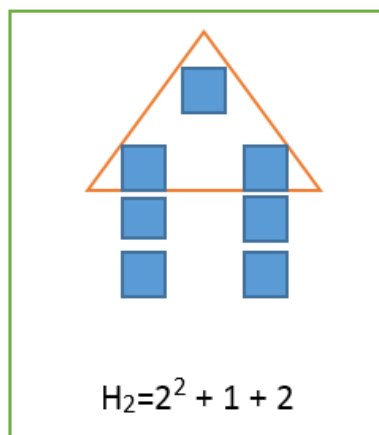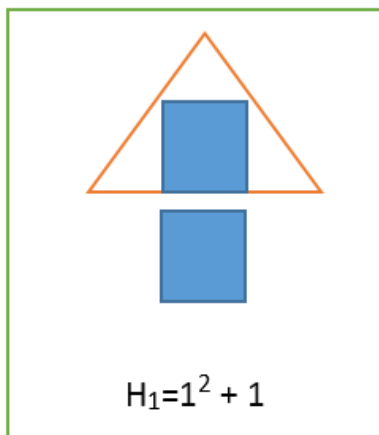
Sample Input #2

```
10
MARK 6 8
MIKE 8 2
MIKA 9 1
MING 6 9
MARK 11 4
MIKE 12 5
MING 15 7
MIKA 6 3
MONG 7 6
MARK 10 10
```

Sample Output #2

```
8 10 4 3 1 2 5 9 7 6
```

Once upon a time, a king decided to line up houses with a pattern. He wanted to have the tiles in the houses with the specific number sequence. The sequence is defined as shown in the picture below.

$H_1 = 1^2 + 1$

$H_2 = 2^2 + 1 + 2$

$H_3 = 3^2 + 1 + 2 + 3$

Formula:

$$H = N^2 + \sum N$$

Can you help a visitor, to find out the number of tiles in the house given the house number?

Input

One line of input contains one integer (N) indicating the house number.

Output

One integer indicating the number of tiles in the house.

Constraints

$0 < N <= 10^3$

Sample Input #1

2

Sample Output #1
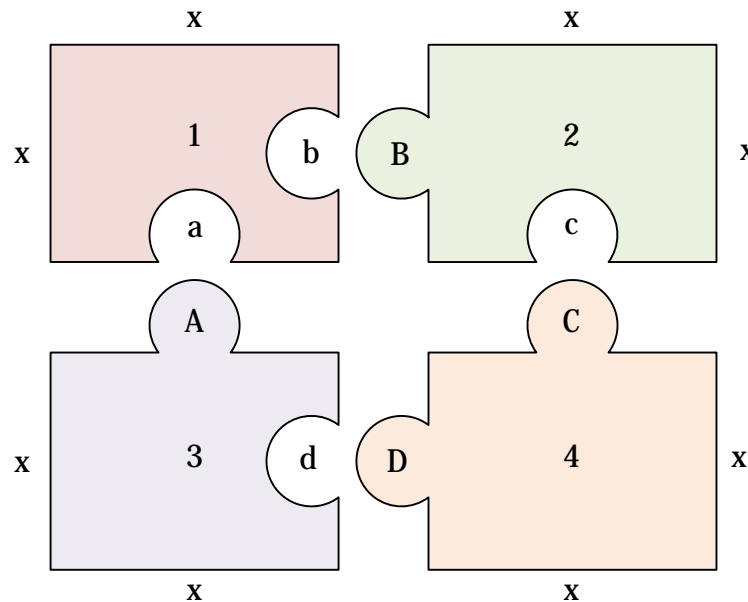
7

Sample Input #2

3

Sample Output #2

15

An archeologist, during his expedition, found a jigsaw puzzle that contained a map. Solving the puzzle leads the archeologist to a hidden treasure. Can you help the archeologist in solving the puzzle?

The puzzle has many pieces and each piece has 4 connecting edges, defined by a letter and the piece itself, defined by a number.

The below observations were made by the archeologist after examining all the pieces:

- An edge of a piece in the puzzle can have either indent or outdent. Lowercase letters are considered indents and uppercase letters are considered outdents. An uppercase letter connects with its lowercase pair (a-A, b-B).
- Two pieces are adjacent if they have a matching connection in the edge where they are adjacent. If a piece doesn't have a connection in one of the sides, that side is a corner and can't be connected to another piece.
- The number on each piece is unique.
- Every piece has to be used exactly once.

Input

The first line is an integer N, denoting the number of pieces. Next N lines is a randomized list of the pieces. Each piece is represented by 5 characters separated by space. The first character is an integer representing the unique ID of the piece. The next 4 chars (a,b,c,d or A,B,C,D) indicate the indent or outdent. If a side doesn't have an indent or outdent then 'x' is used. The characters are specified in the order by Top, Left, Bottom and Right sides.

Output

The solved puzzle represented by puzzle piece in a matrix format. Note that the puzzle need not be a perfect square.

Constraints

$0 < N < 200$

Sample Input #1

```
4
1 x x a b
2 x B c x
3 A x x d
4 C D x x
```

Sample Output #1

```
1 2
3 4
```

Sample Input #2

```
9
1 B x x c
2 a x b D
3 x B c A
4 C d b C
5 x x A b
6 D a x x
7 E c d x
8 x a e x
9 B C x A
```

Sample Output #2

```
5 3 8
2 4 7
1 9 6
```

You are given an infinite 2-D grid with the bottom left cell referenced as $(1, 1).$ All the cells are initialized with zero. Let's play a game?

The game consists of N steps wherein each step you are given with two integers A and B. The value of each of the cells in the co-ordinate (u, v) is increased by 1, where (u, v) ranges $1 \leq u \leq A$ and $1 \leq v \leq B$. After N such steps, if X is the largest value amongst all the cells in the rectangular board, can you print the X and number of occurrences X's in the board?

Input

The first line of input contains a single integer $N.$

The next N lines, each contains two integers A and B separated by a single space.

Output

The largest number X in the grid and the number of occurrences of X separated by space.

Constraints

$0 < A, B <= 10^6$

$0 < N <= 10^2$

Sample Input #1

```
3
2 3
3 7
4 1
```

Sample Output #1

```
3 2
```

Sample Input #2

```
5
4 10
3 7
4 5
12 8
7 6
```

Sample Output #2

```
5 15
```

Given Hydrocarbon's chemical formulae, count the number of Carbon and Hydrogen Atoms in the formulae.

Input can be checked if it is correct or not by matching the opening and closing parentheses. If there is a mismatch in parentheses then the output should be marked as "INVALID".

If the input is correct, then print the number of Carbon and Hydrogen atoms or else print "INVALID"

Input

The first line consists of one integer T denoting the number of test cases

T subsequent lines contain a single string N of form CaHb...(CcHd)e... where a, b, c, d, e, ... are integers. Note that (C2H4)3 means that there is 3 occurrences of (C2H4).

If a number is not specified after a close parenthesis, it defaults to 1.

Output

Print T lines where each line contains 2 space separated integers X and Y representing the number of carbon and hydrogen atoms respectively if the corresponding input is correct else it should print "INVALID"

Constraints

$0 < T <= 10^4$

$1 < a, b, c, d..... <= 9$

Level of nesting in parentheses can be at most 2

Sample Input #1

```
2
CH3CH2CH3
CH3(C2H5))CH3
```

Sample Output #1

```
3 8
INVALID
```

Sample Input #2

```
2
CH3(CH2)5CH3
CH3CH2CH2(C2H5)2
```

Sample Output #2

```
7 16
7 17
```

A toy factory produces N different types of toys. The rate of production per day of each of these N toy types follows a specific numeric series pattern (e.g. arithmetic, geometric etc.). The factory needs a software that can help them forecast the next day's rate of production of an arbitrary type of toy, given the history of the number of that toys produced.

```
2 4 6 8 10
13 16 19 22 25
3 9 27 81 243
0 6 18 36 60 90
2 6 12 20 30 42 56
2 6 14 30 62
1 -3 9 -27 81
```

Your task is to create a program which can predict the number of toys produced of any arbitrary toy type among the 'N' different types (each of which follow a given pattern) given the production history of that toy.

Input

Single line of 4 integers which are in some relation separated by a space

Output

Single integer corresponding to the next element in the input sequence

Constraints

N/A

Sample Input #1

```
14 16 18 20
```

Sample Output #1

```
22
```

Sample Input #2

```
2006 4014 8030 16062
```

Sample Output #2

```
32126
```