FKHÍ 2024

Reykjavík University, 14. september

Problems

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Problem A
Austan Atlantshafs
Problem ID: austanatlantshafs

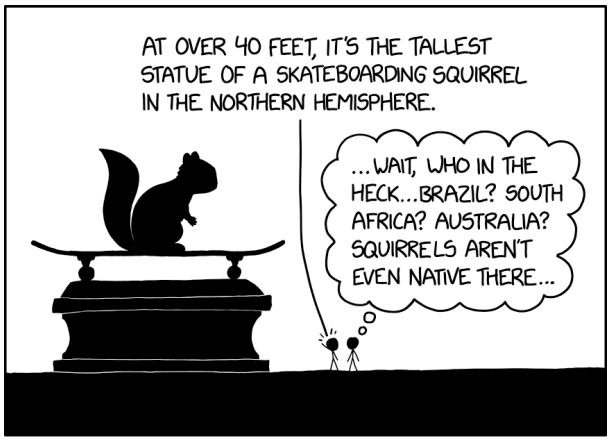

Image by Randall Munroe, xkcd.com

Many cities and other institutions have a tendency to raise statues of various kinds to garner attention. In this context larger statues are of course preferable, as a larger statue garners more attention. It is even better when the statue is the largest in a large area around where it is raised. Each such institution wants to advertise its statue as "the largest statue in X" where X is the largest named area which makes the statement true. For example if a statue were the largest in all of Europe, it would be a far better advertisement to claim it is the largest in all of Europe rather than it being the largest in Iceland, even though that would also be true if the statue were located in Iceland. Note that if, for example, Germany and France had equally large largest statues, neither of them would be the largest in all of Europe.

Input

The first line of input contains a single integer n, the number of named areas, satisfying $1 \leq n \leq 100\,000$. Next there are n lines, each describing one named area. The i-th line contains a string s_i, a string t_i and a positive integer x_i, separated by spaces. s_i gives the name of the i-th area and t_i gives the name of the area the i-th area is contained in. t_i is always one one of the areas named in the input. x_i then gives the height of the statue raised in the i-th area, where $1 \leq x_i \leq 10^9$ if there is a statue in that area and $x_i = -1$ otherwise. If the area contains smaller areas $x_i = -1$ will hold, but $x_i > 0$ otherwise. No two different areas have the same name.

Each string in the input has length at most 20 and contains only lowercase English letters. The total length of all strings in the input is at most 10^6.

The first area is always `jord`, which is given to contain itself. No other area contains itself, directly or indirectly.

Output

For each area with a statue, print the name of the largest area such that the statue is the largest statue in that area. An area is considered larger than another if it contains the other area. The names should be printed on separate lines, and given in the same order as the input.

Sample Input 1	Sample Output 1
17 jord jord -1 evropa jord -1 asia jord -1 amerika jord -1 afrika jord -1 eyjaalfa jord -1 thyskaland evropa 100 frakkland evropa 80 kina asia 130 indland asia 70 norduramerika amerika -1 suduramerika amerika -1 kalifornia norduramerika 110 kanada norduramerika 90 brasilia suduramerika 150 sudurafrika afrika 140 astralia eyjaalfa 200	evropa frakkland asia indland norduramerika kanada amerika afrika jord

Problem B
Bjagað Beðaltal
Problem ID: bjagadbedaltal

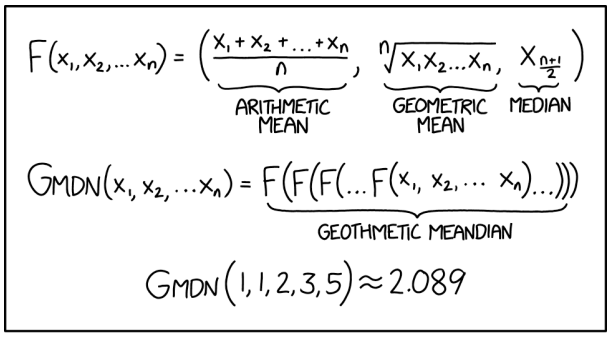

Image by Randall Munroe, xkcd.com

At the end of every programming contest, statistics and fun facts are collected to show the contestants afterwards. Often average number of solves, or average number of tries to solve a given problem are calculated. Allegedly, someone at the statistics department said that arithmetic averages are very uninteresting. To make the contest data analysis exciting enough for the statisticians the contest hosts have decided to use a new exciting method to calculate averages. Instead of following the good example set by Hölder in how to generalise averages, the example of Randall Munroe is followed instead. That is where the geothmetic meandian comes in. As the image shows, the geothmetic meandian is calculated in the following way:

Let n be an odd number. A sequence of numbers $x_1, x_2, \ldots, x_n$ is sorted resulting in the sequence $y_1, y_2, \ldots, y_n$. The original sequence is then replaced by the sequence

$$n^{-1} \sum_{i=1}^{n} y_i, \sqrt[n]{\prod_{i=1}^{n} y_i}, y_{(n+1)/2}$$

This is then repeated on the new sequence resulting in another sequence. If the repetition is performed infinitely often the sequence converges to a single repeated value, this repeated value is then the geothmetic meandian.

Input

The input begins with a single odd integer $1 \leq n \leq 10^5$. The next line contains n real values $x_1, \ldots, x_n$. For all i it is guaranteed that $0 < x_i \leq 10^9$. All real values have at most 6 digits after the decimal.

Output

Print the geothmetic meandian of $x_1, \ldots, x_n$. The answer is considered correct if its absolute or relative error from the true answer is at most 10^{-5}.

Sample Input 1	Sample Output 1
5 1 1 2 3 5	2.08905794953626

Sample Input 2	Sample Output 2
9 1 1.5 2 2.5 3 3.5 4 4.5 5	2.91827409737909

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Problem C
Chili COM Carne
Problem ID: chilicomcarne

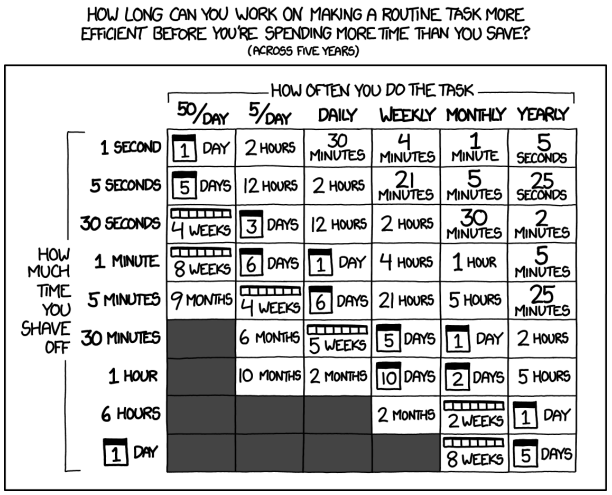

Image by Randall Munroe, xkcd.com

Programmers all know COM, which is of course an abbreviation for Cost Of Maintenance and has no other interpretations. Often such costs can be lowered by automating certain tasks, but many programmers are overzealous in this regard and end up spending more time programming an automatic solution than it would have taken them to do the task by hand for the rest of their lives.

To rectify this a program has to be made that can automatically determine whether it is worth it to write a program to automate things. As this program does not yet exist we can't say whether it's worth it to write this program, so that'll just have to be revealed in due time.

We measure time using a few different units, with the largest one being a year. A single year has 52 weeks. Each week has 5 work days and each work day has 8 work hours. Finally there are of course 60 minutes to an hour and 60 seconds to a minute.

Given how often the task has to be done, how long it takes to do it, and how long it would take to automate it, make a program that can tell how much time it would save to automate the task over the course of the next five years. The saved time is measured starting from the program being finished.

Input

The first line gives how often the task needs to be performed, given as `n sinnum daglega` where n is an integer and `daglega` means daily. If n is one the second word is replaced with `sinni`. The third word can also be `vikulega` which means weekly or `arlega` which means yearly. The next line gives how long it takes to perform the task each time, given as `n sekundur` where n is an integer and `sekundur` means seconds. Instead of `sekundur` the second word can also be `minutur` (minutes), `klukkustundir` (hours), `dagar` (days), `vikur` (weeks), `ar` (years). If $n = 1$ the input contains the singular form of the word instead, i.e. one of `sekunda`, `minuta`, `klukkustund`, `dagur`, `vika` or `ar`, given in the same order as above. Finally the third and last line gives how much time it would take to automate the task, given in the same format as the line before. n is always a positive integer with value at most 10. Note that since the task might be taken care of by more than a single person it is possible that it takes more than five years to perform the task over the next five years in total.

Output

Print the number of seconds the program would save over 5 years. If automating the task takes strictly more time than doing the task manually over the next 5 years, instead print `Borgar sig ekki!`.

Sample Input 1	Sample Output 1
1 sinni vikulega 1 minuta 1 klukkustund	12000

Sample Input 2	Sample Output 2
5 sinnum daglega 10 sekundur 2 vikur	Borgar sig ekki!

Problem D
Deildadrottnun
Problem ID: deildadrottnun

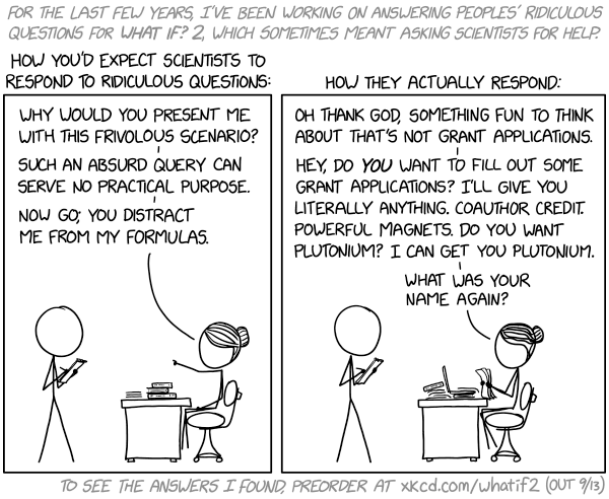

Image by Randall Munroe, xkcd.com

The government is currently examining the universities' finances. Last contest had you follow a system in which all departments got the same amount of money. This along with some other constraints made it such that some money went unused, which clearly has to be fixed. This time the government will assign each department some budget and remove all grant and funding request processes. This is done because some professors were so tired of grants and funding applications that they had started to bribe others into taking care of it for them.

To make sure the plutonium reserves of the universities of Iceland do not fall into the wrong hands it is important this is done well.

The departments of the universities have been ordered by size and should get appropriate funding, so no two departments that get funding can get the same amount of funding. Furthermore the first funded department must get one or two million ISK exactly. The next funded department must get two or three million ISK, the third exactly three or four million ISK and so on.

Input

The first and only line of input contains an integer n, the amount of money to distribute, counted in millions of ISK. It is guaranteed that $1 \leq n \leq 10^{10}$.

Output

The first line of output should contain a single integer, the number of departments that get funding. The next line should print the amount of money each department gets, given in increasing order and separated by spaces, all given in terms of millions of ISK. If there is more than one way to distribute the funding such that all constraints are met, any one of them will be accepted. The input will be such that at least one solution exists.

Sample Input 1	Sample Output 1
6	3 1 2 3

Sample Input 2	Sample Output 2
16	5 1 2 3 4 6

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Problem E
Einfasa Eindahraðall
Problem ID: einfasaeindahradall

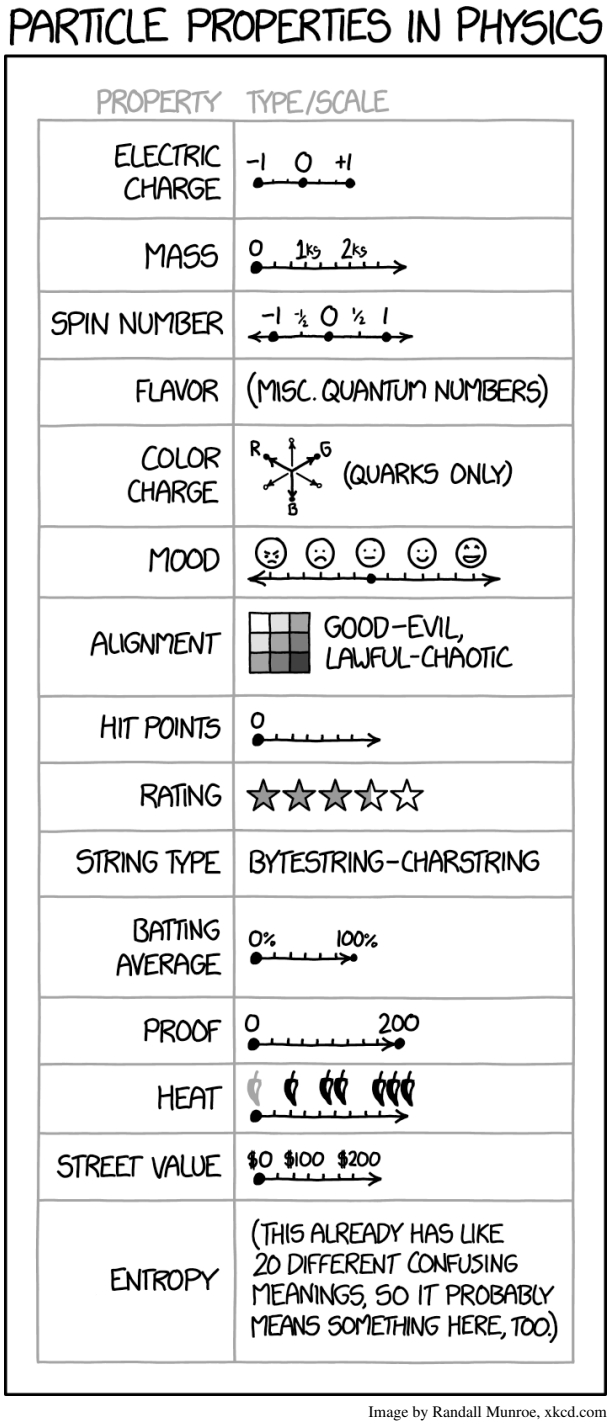

Image by Randall Munroe, xkcd.com

As was covered in the last contest, an Icelandic particle accelerator has been built. Since last time the accelerator has been converted to use single phase power, since according to some electrical engineer the other phases were interfering with measurements. The tin foil hat was an unusual fashion statement, but the machine works in any case. Now the only thing left is to process all the data it spits out.

The particle accelerator, as the name suggests, accelerates particles. This is done to then smash particles together with great speed to create and analyse new and rare particles. These particles are described using various quantum properties, as shown on the image.

By scaling things properly all of these quantum properties can be described by integer values, where each property has some minimum and maximum possible value, and can take every integer value there between.

The particle accelerator spits out these quantum values for each particle it measures. Together these values determine the type of the particle, which is a sequence of integers, which uniquely determine the particle. But since the physicists are looking for specific particles given by string theory conjectures, the data has to be processed somewhat.

For each conjecture the physicists have they want to know how many particles were measured that fit their description, meaning that each of its quantum properties fits in some given interval. For example if particles were given by charge, mass and flavour the physicists might want to know the number of particles with charge exactly -3, mass from 2 to 5 and flavour from -1 to 1. An example of a particle type satisfying these bounds is $(-3, 4, 0)$.

Input

The first line of input contains a positive integer n, the number of quantum properties the particle accelerator measures. You may assume $1 \leq n \leq 10$. Next there is a line with n pairs of integers l_i, r_i where l_i is the minimum value and r_i is the maximum value of the i-th quantum property. The values are given in the order l_1, r_1, l_2, r_2 and so on, separated by spaces. You may assume $-10^9 \leq l_i \leq r_i \leq 10^9$ for all i and that the particles can only have at most 10^6 different types in total. Next there is a line with a positive integer p, the number of particles the accelerator measured. You may assume that $1 \leq p \leq 10^5$. Next there are p lines where the i-th lines describes the i-th particle measured. The i-th line contains n values x_j where x_j gives the value of the j-th quantum property of the i-th particle measured. It satisfies $l_j \leq x_j \leq r_j$. This means the i-th line gives the type of the i-th particle measured. Next there is a line with a positive integer q, the number of conjectures from the physicists. You may assume $1 \leq q \leq 10^5$. Finally there are q more lines where the i-th line describes the i-th conjecture. The i-th line contains n pairs of integers a_j, b_j where a_j is the minimum value and b_j the maximum value the j-th quantum property can be. The values are given in the order a_1, b_1, a_2, b_2 and so on, separated by spaces. You may assume $-10^9 \leq a_j \leq b_j \leq 10^9$ for all j.

Output

For each conjecture print a single integer on its own line, the number of particles in the input falling within the bounds of the conjecture for every quantum property. Print the answers in the same order as the conjectures are given in the input.

Sample Input 1	Sample Output 1
3 -5 5 0 1 3 9 8 0 0 3 0 1 5 -5 0 3 5 1 7 1 1 9 -1 0 5 2 1 3 -2 0 7 4 -5 5 0 1 3 7 0 0 0 1 3 9 -10 10 -2 2 -10 10 0 5 1 1 4 6	7 2 8 1

Problem F
Fljúgandi Furðuhlutir Forðast Fókus
Problem ID: fljugandi

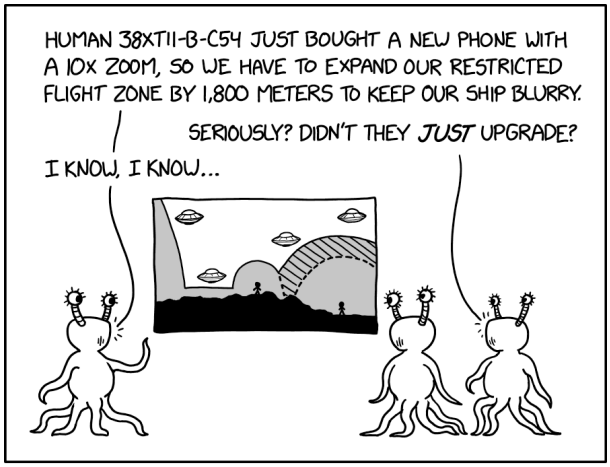

Image by Randall Munroe, xkcd.com

As is well known, the Earth is of course flat and is monitored by unscrupulous aliens who wish to make sure no one finds out about this secret flatness. To this end the aliens must make sure no one can get a clear picture of their spaceships.

The aliens thus maintain a database of where each individual is located and the quality of their cameras. From this they can calculate a minimum radius they have to stay out of for any given individual. This however complicates the aliens travel plans significantly. If too many individuals obtain good cameras some travel plans might not just be slowed down but made outright impossible. Can you help determine when this occurs? Because of the unusual alien spaceship design all travel plans assume that the spaceships stay at a fixed height above the ground.

Input

The first line of input contains a positive integer n, the number of individuals being monitored, and an integer h, the height above the ground at which the spaceship stays. Initially no one has a camera. You may assume that $1 \leq n \leq 5 \cdot 10^4$ and $0 \leq h \leq 10^9$. Next there are two lines describing the starting and desired ending position of the spaceship, each given by two integers giving the x and y-coordinates, respectively. Next there are n lines, each with two integers x, y. The i-th line gives the coordinates of the i-th individual.

Next there is a line with a single positive integer m, the number of camera purchases. You may assume $1 \leq m \leq 10^5$. Then m lines follow where the i-th line describes the i-th camera purchase. Each line contains an integer j_i, the index of the individual buying the camera, and an integer r_i giving the corresponding minimum radius that the spaceship has to stay outside of.

The minimum radius for a given individual is always given by the best camera they have access to. You may assume $1 \leq j_i \leq n$ and $1 \leq r_i \leq 10^9$. All coordinates in the input have a minimum value of 10^{-9} and a maximum value of 10^9.

Output

If the i-th camera purchase blocks the spaceship from being able to make it from the starting position to the target position print i. If it is possible to travel between the starting and target location while staying outside of the cameras' views after all camera purchases, instead print -1. The purchases are made in the same order as they appear in the input.

Sample Input 1

```
4 0
5 5
20 20
0 0
10 0
0 10
10 10
6
1 6
2 2
3 6
4 6
2 4
2 6
```

Sample Output 1

```
6
```

Sample Input 2

```
4 0
4 5
5 5
0 0
10 0
0 10
10 10
4
1 6
2 6
3 6
4 6
```

Sample Output 2

```
-1
```

Sample Input 3

```
2 10
-5 0
5 0
5 0
0 0
2
1 10
2 100
```

Sample Output 3

```
2
```

Problem G
Glötuð Gildi
Problem ID: glotudgildi

Image by Randall Munroe, xkcd.com

The universities of Iceland have decided to host a large Nim tournament. Exactly n teams have registered, and each team will compete exactly once against every other team. As is well known there are no ties in Nim, so in each game there is exactly one winning team which receives 1 point. At the end the scores of every team have been collected, but in all the excitement the actual results of individual games got lost! This is not good, so Jörmunrekur is going to try to guess what the results looked like. The odds that he guesses right are then dependant on the number of ways the tournament could have gone. Thus this needs to be calculated as soon as possible!

Consider for example a tournament with teams A, B, C and final scores $1, 1, 1$. Possibly A beat B, B beat C and C beat A. But it could also be that A beat C, C beat B and B beat A. We can see that these are the only options, so in this case the answer would be 2.

Input

The input begins with a single integer $0 \leq n \leq 16$. On the next line there are n integers, each also at least 0 and at most 16. The i-th integer denotes the score of the i-th team.

Output

Print the number of ways the tournament could have gone. Two ways are considered different if some team beat another in one way, but not in the other.

Sample Input 1	Sample Output 1
5 1 2 2 2 3	14

Sample Input 2	Sample Output 2
4 2 1 3 0	1

Sample Input 3	Sample Output 3
5 0 1 1 4 4	0

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Problem H
Höskuldarháska
Problem ID: hoskuldarhaska

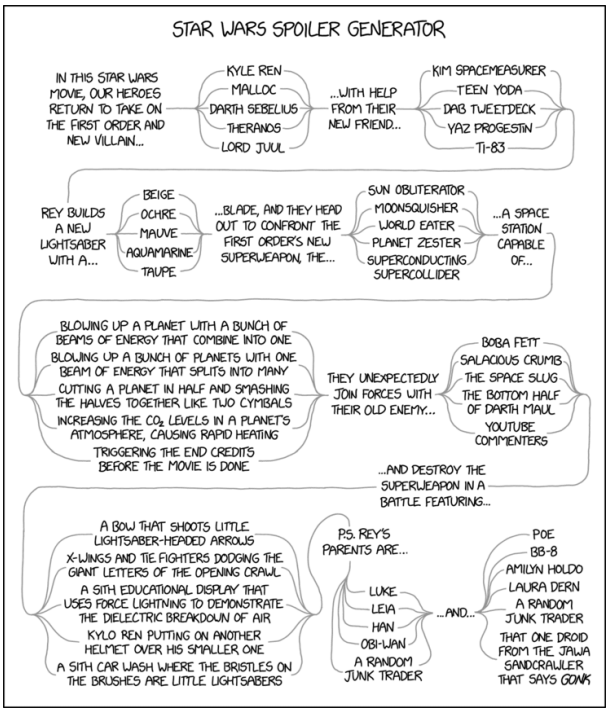


Image by Randall Munroe, xkcd.com

FKHÍ's continuous integration system performs many tasks. Ensures input data is formatted correctly, looks for typos in problem statements and more. After having made a reference to a popular movie in the last contest and spoiled an important plot point for those who had not seen it yet, the organisers have decided to add a spoiler filtering program into the integration system. The spoiler filtering program should analyse all text in the contest data files and make sure there is no text spoiling important plot points that people would rather not have spoiled. But to create such a system one needs to determine what text is a spoiler, so the program knows what it is looking for. Thus your task is to create a text file containing all possible spoilers.

All possible first words of a spoiler have been determined, same for all possible second words and so on. Thus the only task left is to generate all possible combinations of these words to prepare the text file.

Input

The input begins with a single integer $1 \leq n \leq 100$, the number of words in each spoiler. n lines follow, one for each word. The i-th line begins with an integer $1 \leq k \leq 100$, the number of options for the i-th word. Next these k words follow on the same line, separated by spaces. These k words are distinct from each other. All words in the input only contain English lower and upper case characters. Each word is at least 1 letter and at most 20 letters in length.

Output

Print all possible ways to combine the words into a spoiler. Each spoiler should be on its own line. The spoilers are to be printed in ASCII-order (note that this is the default order in most programming languages). It is guaranteed that the output will contain at most 10^6 letters.

Sample Input 1

```
5
3 kyle malloc sebelius
1 gets
1 a
3 beige ochre aquamarine
2 lightsaber moonsquisher
```

Sample Output 1

```
kyle gets a aquamarine lightsaber
kyle gets a aquamarine moonsquisher
kyle gets a beige lightsaber
kyle gets a beige moonsquisher
kyle gets a ochre lightsaber
kyle gets a ochre moonsquisher
malloc gets a aquamarine lightsaber
malloc gets a aquamarine moonsquisher
malloc gets a beige lightsaber
malloc gets a beige moonsquisher
malloc gets a ochre lightsaber
malloc gets a ochre moonsquisher
sebelius gets a aquamarine lightsaber
sebelius gets a aquamarine moonsquisher
sebelius gets a beige lightsaber
sebelius gets a beige moonsquisher
sebelius gets a ochre lightsaber
sebelius gets a ochre moonsquisher
```

Problem I
Innvolsarinnihaldslýsing
Problem ID: innvols

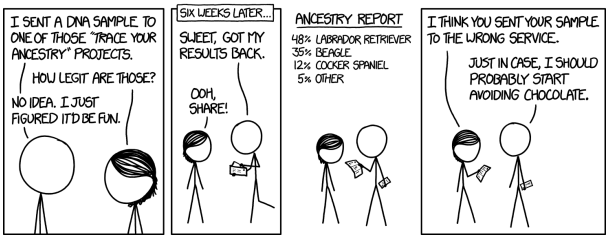


Image by Randall Munroe, xkcd.com

Ingfríður has grown curious about her internal content description. She heard that various properties of an individual can be deduced from these data, so she has to try it. After getting the data sent over from the company Encode she has everything she needs. To analyse the data she needs to find sections that match known patterns, but if analysing some sections is good, analysing all sections must be better. Thus Ingfríður wants to analyse all sections. We define a section to be all characters in the data from some specific starting character to some ending character.

Input

The input contains a single line giving the internal content description of Ingfríður. The description consists of the letters `A`, `C`, `G` and `T` and has no spaces. The description is at most 100 letters in length.

Output

For each section in the description print one line, the number of occurrences it has in the description and then the section itself, separated by spaces. A section should not be printed multiple times in the output even if it occurs multiple times. The lines should be printed in descending order by the number of occurrences. If two sections are tied for number of occurrences, resolve the tie by putting the section that comes first alphabetically before the other.

Sample Input 1	Sample Output 1
ACGT	1 A 1 AC 1 ACG 1 ACGT 1 C 1 CG 1 CGT 1 G 1 GT 1 T

Sample Input 2

```
AGAGA
```

Sample Output 2

```
3 A
2 AG
2 AGA
2 G
2 GA
1 AGAG
1 AGAGA
1 GAG
1 GAGA
```

Sample Input 3

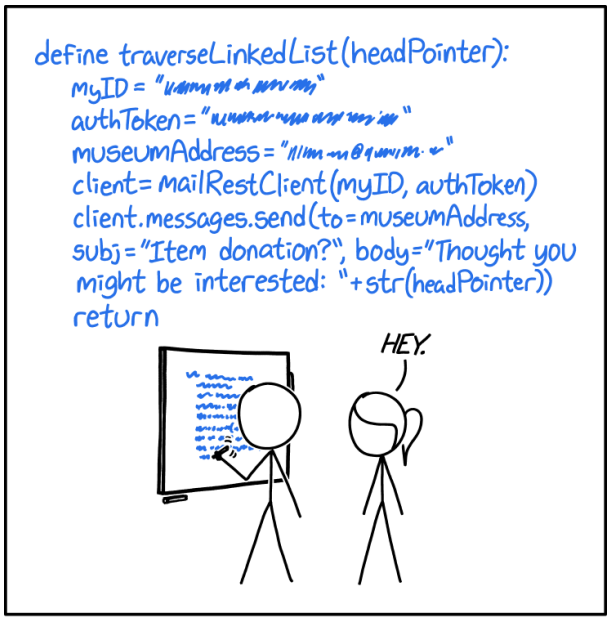
```
GATTACA
```

Sample Output 3

```
3 A
2 T
1 AC
1 ACA
1 AT
1 ATT
1 ATTA
1 ATTAC
1 ATTACA
1 C
1 CA
1 G
1 GA
1 GAT
1 GATT
1 GATTA
1 GATTAC
1 GATTACA
1 TA
1 TAC
1 TACA
1 TT
1 TTA
1 TTAC
1 TTACA
```

Problem J
Jaðarjuð
Problem ID: jadarjud

For the last few years, the prospect of merging some of the universities of Iceland has been considered. Finally, some actual plans are being drawn about how this could be implemented, but in order to make good plans the organising committee needs some data on how the plans are looking thus far as they plan it out. After hearing about this programming contest and nagging the jury incessantly, it is decided that the contestants can take care of this not at all tedious task.



CODING INTERVIEW TIP: INTERVIEWERS GET REALLY MAD WHEN YOU TRY TO DONATE THEIR LINKED LISTS TO A TECHNOLOGY MUSEUM.

Image by Randall Munroe, xkcd.com

Input

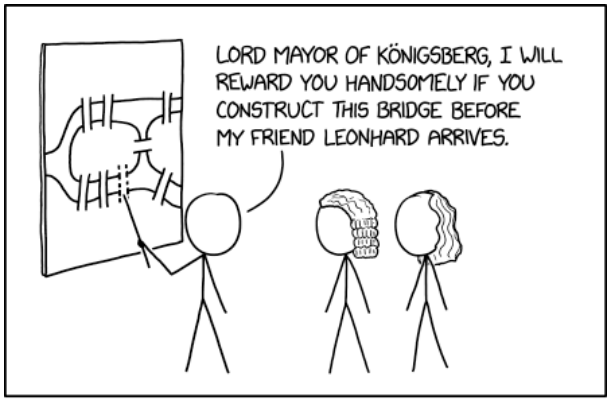
The input begins with a line containing two integers, n which gives the number of universities and q which gives the number of operations. You may assume that $1 \leq n, q \leq 5 \cdot 10^5$. Next there are q lines, each giving one operation. They each begin with one of the letters `j`, `u` or `p`. If the line begins with `j` it is followed by two integers $1 \leq a, b \leq n$ with $a \neq b$. This means university number a and university number b should be merged. If the line begins with `u` the last merger should be reversed. If no merger is available to be undone, the operation should do nothing. Finally if the line begins with `p` a single integer $1 \leq a \leq n$ follows, and all universities currently merged with university number a should be printed on a single line, including a itself. Note that if a is merged with b and b merged with c, a will be considered to have been merged with c.

Output

For each operation starting with a `p` a line should be printed, as described above. The integers on the line should be separated by spaces, but they can be printed in any internal order. The lines themselves should be printed in the same order as the operations are given in the input. You may assume you will not have to print more than 10^6 numbers.

Sample Input 1	Sample Output 1
4 11 p 3 j 1 2 j 3 4 p 2 j 1 3 j 1 2 p 2 u u u p 4	3 1 2 1 2 3 4 4

Problem K
Kjördæmi Königsbergs
Problem ID: kjordaemikonigsbergs



I TRIED TO USE A TIME MACHINE TO CHEAT ON MY ALGORITHMS FINAL BY PREVENTING GRAPH THEORY FROM BEING INVENTED.

Image by Randall Munroe, xkcd.com

Königsberg, now known as Kaliningrad, is a city well known for its bridges. Now bridges are to be built between the districts of the city to ensure travels around the city are possible. Each bridge connects two districts of the city.

Building the bridges can be expensive and each bridge only immediately benefits the citizens of the two districts which the bridge connects. Therefore, the funding for each half of a bridge comes from the two districts that build each half. Sadly, inequality is prevalent in the city and not all districts have equal funding to spend on the bridges. Note also that due to immense bureaucracy, all of the funding must be spent and therefore the exact number of bridges the funding covers must be built.

It is not important where each bridge leads to on its own. However, after all bridges have been built it should be possible to travel by them around the entire city. It is forbidden though to spend funds on two bridges which connect the same two districts. It is also forbidden to spend funds on a bridge that connects a district to itself. It can therefore prove difficult to connect the districts such that all bridges are built.

Can all the bridges be built such that the requirements are fulfilled? If so, how should it be done?

Input

Input consists of two lines.

The first line contains a single integer n, the number of districts in the city, where $1 \leq n \leq 100\,000$. The second line consists of n non-negative integers $d_1, \ldots, d_n$, separated by spaces, where d_i represents the number of halves of bridges that district i can afford to build. It is guaranteed that the total number of bridges is at most $1\,000\,000$.

Output

If the bridges cannot be built such that the requirements are satisfied you should output `"Omogulegt!"`.

Otherwise, you should first output a line consisting of two space separated integers n and m, where n is the number of districts and m is the total number of bridges. Then output m lines, the i-th of which consists of two space separated integers, a_i and b_i, denoting that a bridge should be built between districts a_i and b_i. Each pair of a_i and b_i must be distinct and must satisfy $a_i \neq b_i$, $1 \leq a_i \leq n$ and $1 \leq b_i \leq n$.

Note, the output can be **very large**, so it is advisable to use fast input and output methods.

Sample Input 1	Sample Output 1
6 3 3 2 2 1 1	6 6 5 2 6 1 1 4 1 3 3 2 2 4

Sample Input 2	Sample Output 2
3 3 2 1	Omogulegt!

Problem L
Lafhræddir Læknar
Problem ID: lafhraeddir

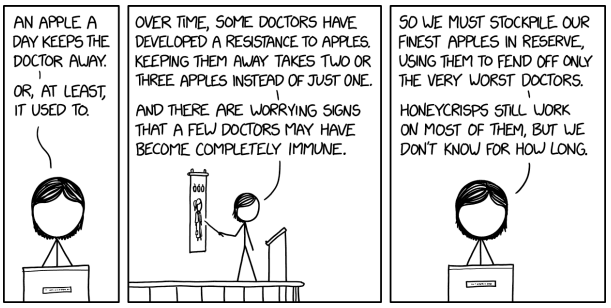


Image by Randall Munroe, xkcd.com

As the new hospital grows ever closer to finishing construction the doctors get ever bolder. They have been spotted past Gamla Hringbraut and even in the wetlands near the airport. This worries both the University of Iceland and University of Reykjavík. Clearly these doctors need to be kept in check.

Luckily, as is well known, doctors can be kept at bay using apples. More specifically keeping them at bay requires one apple per doctor per day. Before this kind of issue could be solved greedily, each doctor was given the weakest apple that would still keep them at bay, and that was repeated for each doctor each day. But now some doctors have developed apple resistances which complicates matters quite a bit.

Given the apple resistances of the doctors and the apple stash of the universities, can you find out for how many days the doctors can be kept in check?

Input

The first line of input contains two positive integers, L which gives the number of types of doctors and E which gives the number of types of apples. You may assume that $1 \leq L, E \leq 500$. The next E lines describe the types of apples. Each line contains the name of the type, the strength of the type and finally how many of that type the universities have stashed away. The strength is a positive integer less than or equal to 10^9. The universities also have a positive integer number of apples stashed away of each type, and at most 10^9 of any type. Finally there are L lines describing the types of doctors. Each line contains the name of the type of doctor, the strength of the type, the number of doctors of that type, how many apple types that type is resistant to and finally the names of those apple types. As with the apples the strength and number are both positive integers less than or equal equal to 10^9. Each type of doctor is resistant to at most 20 types of apples. All names in the input are strings containing only lower case ASCII characters with no spaces. All names are at most 20 characters in length. All names are unique.

Output

Print the number of days the doctors can be held at bay. That is to say if each doctor can be given d apples with a strength which is not lower than the doctor's strength and the doctor is not immune to, but the same is not true for $d + 1$, print d.

Sample Input 1	Sample Output 1
3 3 raud 4 7 graen 5 6 gul 3 20 baeklun 4 2 1 raud heimilis 3 5 0 svefn 1 1 2 raud gul	2

Problem M
Mergjað Mál
Problem ID: mergjadmal

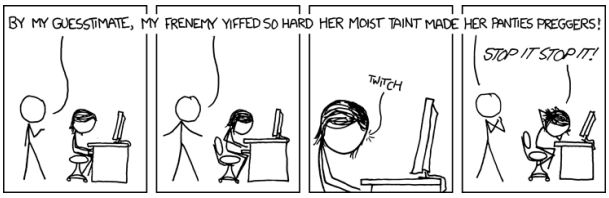


Image by Randall Munroe, xkcd.com

After turning in the draft of the problems for Forritunarkeppni Háskólanna á Íslandi the results were that the prose was too terse and dated. It had to appeal to a younger audience better, to use their language. This problem exists as a response to this criticism. This sentence is your last chance to turn back and spare your eyes from this horror.

Isn't it way lame to have to chew through all these problems? Totally wack, not a good vibe. Way too many still feeling the wild weekend, a totally untubular feeling. But don't trip, this problem will be a totally rad break from the mansplaining of the other problems. After finishing this problem you'll be totally Knuthpilled and ACmaxxed, a sigma programmer, you'll wreck the rest right away, no cap. Skibidi ohio gyatt rizz everyone at the next fortnite tournament with those mad skillz, you'll be the goat of the party for sure.

Input

The input dumps a whole bunch of printable ASCII letters on you. Not more than 1000 of them though, so you can chill. And no whitespace, that would just be real un-rad of us. Watch out dude, it might be empty.

Output

Print `Mergjad!` if 69 or 420 appear in the input, otherwise, `Leim!`.

Sample Input 1	Sample Output 1
`fAnUm6TaX9sKiBiDiToIlEt`	`Leim!`

Sample Input 2	Sample Output 2
`alphared420pilled`	`Mergjad!`

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