Problem B: Andy's First Dictionary

Time limit: 3 seconds

Andy, 8, has a dream - he wants to produce his very own dictionary. This is not an easy task for him, as the number of words that he knows is, well, not quite enough. Instead of thinking up all the words himself, he has a brilliant idea. From his bookshelf he would pick one of his favourite story books, from which he would copy out all the distinct words. By arranging the words in alphabetical order, he is done! Of course, it is a really time-consuming job, and this is where a computer program is helpful.

You are asked to write a program that lists all the different words in the input text. In this problem, a word is defined as a consecutive sequence of alphabets, in upper and/or lower case. Words with only one letter are also to be considered. Furthermore, your program must be Case Insensitive. For example, words like "Apple", "apple" or "APPLE" must be considered the same.

Input

The input file is a text with no more than 5000 lines. An input line has at most 200 characters. Input is terminated by EOF.

Output

Your output should give a list of different words that appears in the input text, one in a line. The words should all be in lower case, sorted in alphabetical order. You can be sure that he number of distinct words in the text does not exceed 5000.

Sample Input

Adventures in Disneyland

Two blondes were going to Disneyland when they came to a fork in the road. The sign read: "Disneyland Left."

So they went home.

Sample Output

a
adventures
blondes
came
disneyland
fork
going
home
in
left
read
road
sign
so
the
dey
to
two
went
were
when

Joke and image taken from the Web
Travel in Desert

Problem C: Travel in Desert

Time limit: 5 seconds

There is a group of adventurers who like to travel in the desert. Everyone knows travelling in desert can be very dangerous. That's why they plan their trip carefully every time. There are a lot of factors to consider before they make their final decision.

One of the most important factors is the weather. It is undesirable to travel under extremely high temperature. They always try to avoid going to the hottest place. However, it is unavoidable sometimes as it might be on the only way to the destination. To decide where to go, they will pick a route that the highest temperature is minimized. If more than one route satisfy this criterion, they will choose the shortest one.

There are several oases in the desert where they can take a rest. That means they are travelling from oasis to oasis before reaching the destination. They know the lengths and the temperatures of the paths between oases. You are to write a program and plan the route for them.

Input

Input consists of several test cases. Your program must process all of them.

The first line contains two integers $N$ and $E$ ($1 \leq N \leq 100; 1 \leq E \leq 10000$) where $N$ represents the number of oasis and $E$ represents the number of paths between them. Next line contains two distinct integers $S$ and $T$ ($1 \leq S, T \leq N$) representing the starting point and the destination respectively. The following $E$ lines are the information the group gathered. Each line contains 2 integers $X$, $Y$ and 2 real numbers $R$ and $D$ ($1 \leq X, Y \leq N; 20 \leq R \leq 50; 0 < D \leq 40$). It means there is a path between $X$ and $Y$, with length $D$ km and highest temperature $R ^{\circ}C$. Each real number has exactly one digit after the decimal point. There might be more than one path between a pair of oases.

Output

Print two lines for each test case. The first line should give the route you find, and the second should contain its length and maximum temperature.

Sample Input

6 9
1 6
1 2 37.1 10.2
2 3 40.5 20.7
3 4 42.8 19.0
3 1 38.3 15.8
4 5 39.7 11.1
6 3 36.0 22.5
5 6 43.9 10.2
2 6 44.2 15.2
4 6 34.2 17.4

Sample Output

1 3 6
38.3 38.3

Problemsetter: Raymond Chun
Problem D: Headmaster's Headache

The headmaster of Spring Field School is considering employing some new teachers for certain subjects. There are a number of teachers applying for the posts. Each teacher is able to teach one or more subjects. The headmaster wants to select applicants so that each subject is taught by at least two teachers, and the overall cost is minimized.

Input

The input consists of several test cases. The format of each of them is explained below:

The first line contains three positive integers \( S \), \( M \) and \( N \). \( S \) (\( \leq 8 \)) is the number of subjects, \( M \) (\( \leq 20 \)) is the number of serving teachers, and \( N \) (\( \leq 100 \)) is the number of applicants.

Each of the following \( M \) lines describes a serving teacher. It first gives the cost of employing him/her (10000 \( \leq C \) \( \leq 50000 \)), followed by a list of subjects that he/she can teach. The subjects are numbered from 1 to \( S \). You must keep on employing all of them. After that there are \( N \) lines, giving the details of the applicants in the same format.

Input is terminated by a null case where \( S = 0 \). This case should not be processed.

Output

For each test case, give the minimum cost to employ the teachers under the constraints.

Sample Input

2 2 2
10000 1
20000 2
30000 1 2
40000 1 2
0 0 0

Sample Output

60000
Problemsetter: Mak Yan Kei
Idea from "Linear Optimization in Applications", S. L. Tang, Hong Kong University Press, 1999
Problem E: Dora Trip

Nobita is in great trouble. Today he failed to hand in his homework again, so he was heavily punished at school. Learning that, his mother gets furious, and therefore assigns him many tasks to do - to buy vegetables at the market, to collect a parcel at the post office and a lot more. Nobita certainly does not want to see his teacher on his way, nor would he like to meet Jyian, the tough bully. As usual, he asks Doraemon for help.

"Oh no!" cried Doraemon. "My everywhere door is broken, and my small propellers have all run out of batteries..." Well, that means Nobita has got to go without Doraemon's magic tools. "Ah, I still have this. It may well be useful." From his 4th-dimensional pocket, Doraemon takes out a map of their living area. He then marks on it the places where Nobita has to visit by asterisks ('*'), and where Jyian or his teacher may appear by crosses ('X'). Now Nobita's job is simple - he has to find the shortest route, through which he would not visit any of the 'crosses', and he could finish the maximum number of the jobs (if not all) given by mum. What he needs is just a computer program that works out the path...

Imagine that you are Nobita. Write the program.

Input

The input file contains no more than 20 test cases. The details of each set are given as follows:

The first line of each case contains two integers \( r \) and \( c \) (1 \( \leq r, c \leq 20 \)), which are the number of rows and columns of the map respectively. The next \( r \) lines, each with \( c \) characters, give the map itself. For each character, a space `` '' stands for an open space; a hash mark `"#"` stands for an obstructing wall; the capital letter `"S"` stands for the position of Nobita's house, which is where his journey is to start and end; the capital letter `"X"` stands for a dangerous place; and an asterisk `"*"` stands for a place he has to visit. The perimeter of the map is always closed, i.e., there is no way to get out from the coordinate of the `"S"`. The number of places that Nobita has to visit is at most 10.

The input file is terminated by a null case where \( r = c = 0 \). This case should not be processed.

Output

For each test case, if Nobita cannot visit any target places at all, just print the line "Stay home!". Otherwise, your program should output the lexicographically smallest shortest path so that the number of target places that Nobita visits is maximized. Use the letters '\( N \)', '\( S \)', '\( E \)' and '\( W \)' to denote north, south, east and west respectively. Note that by 'north' we mean facing upwards. You can be sure that the length of a correct output path will never exceed 200.
### Sample Input

```
5 5
#####
# S#
# XX#
# *#
#####

5 5
#####
#* X#
###X#
#S *#
#####

5 5
#####
#S X#
# X#
# #*#
#####
0 0
```

### Sample Output

```
WWSSEEWWNNEE
EEWW
Stay home!
```

*Problemsetter: Mak Yan Kei*
Problem F: Trouble of 13-Dots

Do you know 13-Dots? She is the main character of a well-known Hong Kong comic series. She is famous of her beauty, as well as the variety of stylish clothes she wears. Here are some pictures of 13-Dots that I found on the Web:

Now 13-Dots is facing a problem. She used to have a large amount of pocket money every month. However, her father has decided to cut down her budget of buying new clothes! In the past, she would buy every dress she liked without hesitation, but now she needs careful consideration before making any purchase. Every month, she prepares a list containing the prices and 'favour indices' (ranging from 1 to 5) of all items she is interested. At the end of the month, she would decide how to spend her money such that the total favour value is maximized. It is important to know that 13-Dots always uses her credit card to pay the bill, which offers her a 200-dollar refund if her total expense in the month exceeds $2000. For example, if her budget is $5000, she can buy clothes with total marked price of at most 5200 dollars.

Since the optimal way is hard to be figured out just by hand, can you write a program for 13-Dots that helps her make the decision? Remember that you should NEVER select an item more than once, even if this leads to a greater total favour value.

Input

The input consists of several test cases. Each of them has the following format:

The first line gives two integers, \( m \) and \( n \) (\( 0 \leq m \leq 10000, 0 \leq n \leq 100 \)), which are the amount of pocket money 13-Dots has and the number of items on the list respectively. The following \( n \) lines each contains two integers, \( p \) and \( f \) (\( 0 < p \leq 4000, 1 \leq f \leq 5 \)), where \( p \) is the marked price of the item, and \( f \) is its 'favour index'.

Input is terminated by EOF.

Output

For each test case, print one line giving the maximum total favour value 13-Dots can get.
Sample Input

500 4
100 2
100 3
200 3
400 4

Sample Output

8

Question 4 in OIPC, Nov. 2003
Image sources include: http://www.hkcomics.com, http://www.yesasia.com,
http://isubculture.ichannel.com.hk