COT 3100 Program #5 Spring 2014
Assigned: 4/7/2014
Check WebCourses for due date

Note: This program (and all programs for the course) are ONLY for students who signed up for the programming option. If you signed up for this option, you MUST DO ALL FIVE programs assigned.

General Program Directions (to be followed for all five programs)

Turn in a single source file, either C or Java, with the name designated in the note at the bottom that solves the problem described below. Please read all of your input from standard in and output to standard out. To test your program with input files, please pipe the input file into your program and pipe the output to another file. If you don't know how to do this, please see a TA to describe this process to you. ***Note: I recommend Java for this assignment so you can use HashMaps and other classes that are part of the Java API.***

The Problem: Actor-Network Relations

Every TV network broadcasts a set of shows. Each show has a set of actors. Actors receive their paychecks from each network with which they act in at least one show. Thus, we can define a set of relations as follows:

A = set of TV networks
B = set of TV shows
C = set of actors/actresses

$R_1 = \{ (a, b) \mid a \in A \wedge b \in B \wedge$ the TV show b is broadcast on network a $\}$
$R_2 = \{ (b, c) \mid b \in B \wedge c \in C \wedge$ the TV show b employs the actor/actress c $\}$

By definition, we then have:

$$R_2 \circ R_1 = \{ (a, c) \mid a \in A \wedge c \in C \wedge \exists b \in B \mid (a, b) \in R_1 \wedge (b, c) \in R_2 \}$$

More naturally, we can redefine the relation composition as follows:

$R_2 \circ R_1 = \{ (a, c) \mid a \in A \wedge c \in C \wedge$ the network a pays the actor/actress c. $\}$

For this program, you will be given all the elements of R_1 and R_2 and be asked to provide all of the elements of $R_2 \circ R_1$. In short, you will be asked to determine which networks each actor gets paychecks from.

Input Format

The first line of the input file will contain a single positive integer, *T (T ≤ 100)*, representing the number of input cases runs to process. The first line of each test case will have to space-separated positive integers, *N (N ≤ 30)*, and *K (K ≤ 200)*, representing the number of TV networks and the number of TV shows for that particular test case. The following *N* lines will contain information about each network, one network per line. Each of these lines will contain the name of the network, followed by each show on the network. This information will be comma separated and commas are guaranteed to not be in any of the names. (All names of networks, shows and actors will contain letters, digits, spaces and typical punctuation except commas only and be no longer than 50 characters.) It is guaranteed that no network will have more than 100 shows and that each network will have at least one show. The following *K* lines will contain information about each show. These lines will have the name of the show, followed by each actor/actress in that show, in another comma separated list. Same rules apply to the actor/actress names as before. No show will have more than 100 actors/actresses, but each will have at least one. Each show name and actor/actress name will appear identical to how it appeared previously in that case. No actor/actress will appear more than once in the list of a single show. The names of all shows, actors/actresses and networks will be unique, so no show will also be the name of an actor, etc.

Output Format

For each input case, output one line per each unique actor/actress. Sort these lines by name of the actor/actress as determined by String compare function/method in the language you use. For each line, output the name of the actor/actress, followed by a colon and a space, followed by a list of each of the networks from which they are receiving paychecks, separated by commas. The list of networks should be in order determined by String comparison of network names.

Sample Input

```
2
3 5
abc,20 20,america's funniest home videos
nbc,about a boy,the voice
cbs,big bang theory
20 20,john stossel
america's funniest home videos,bob saget
about a boy,minnie driver,david walton
the voice,adam levine,shakira,blake shelton,usher
big bang theory,kaley cuoco,mayim bialik
3 9
X,A,B,C
Y,D,E
Z,F,G,H,I
A,AA,BB
B,CC
C,AA,CC
D,DD
E,BB,CC,DD
F,AA,CC
```

```
G,AA,DD
H,AA
I,AA,DD
```

Sample Output

```
adam levine: nbc
blake shelton: nbc
bob saget: abc
david walton: nbc
john stossel: abc
kaley cuoco: cbs
mayim bialak: cbs
minnie driver: nbc
shakira: nbc
usher: nbc
AA: X,Z
BB: X,Y
CC: X,Y,Z
DD: Y,Z
```

Deliverables

A single source file, named either ***tv.c*** or ***tv.java*** that solves the program stated above, using the input and output formats stated above, using ***standard input and standard output.*** The file should be submitted via WebCourses by the due date and time stated in WebCourses.