CyberChallenge.IT 2023 - Programming Test

Problem 4 - "The team selection" [100 points]

It's August 2023. CyberChallenge.IT has come to an end, with the national champions' title assigned with it. So everything is done for this year, right? No! There is one last step: the European Cyber Security Challenge (ECSC). At ECSC, every European nation sends its best M hackers to battle in an intense 2-days long full-immersion of CTFing, with of course Italy being one of them!

In particular, *Team Italy*'s trainers need to choose the best M-people team among N candidates.

Every candidate is described by a unique id (from 1 to N) and a set of S skills, each with an associated *skill name* (in the form of a 3-characters long string, with only uppercase letters) and a non-negative integer *skill score* (from 1 to 100), stating how strong a candidate is in that specific skill.

The trainers studied a lot the competition format, and established an optimal set of (possibly repeated) skills that the team should satisfy to guarantee the best possible performance. Each of the 10 selected participants will be assigned one of these skills as their *role* inside the team.

The global score of the team is the sum of the skill scores of its members in the role they got assigned to. Other skills of each members do not count in the global score.

Your task is to determine the maximum possible global score for Team Italy, given the list of candidates.

Note: it is possible to assign a player to a role that is not listed in their skills. In that case, that player will count as 0 in the global score.

Problem Details

Input

Each test contains multiple testcases. The first line contains the number of test cases T. Description of the test cases follows.

The input consists of $2 + N(S + 1)$ lines:

- Line 1: the numbers N, M and S, separated by a space.
- Line 2: the optimal set of skills required by the trainers, as a list of M space-separated skill names.
- Lines $3, \ldots, 2 + N(S + 1)$: every group of $S + 1$ lines is formatted as follows:
    - Line 1: the unique id of the candidate.
    - Lines $2, \ldots, S + 1$: one skill name and the corresponding skill score, separated by a space.

Output

The output must contain T positive integers, one for each line, that represent the maximum global score that can be achieved with the available candidates for each testcase.

Scoring

Your program will be tested on a number of testcases grouped in subtasks. In order to obtain the score associated to a subtask, you need to correctly solve all its testcases.

- **Subtask 1** [**30 points**]: $10 \leq N \leq 100$, $M = 10$, $S = 1$, $T = 1$.

- **Subtask 2** [**30 points**]: $10 \leq N \leq 100$, $M = 10$, $1 \leq S \leq 10$, $1 \leq T \leq 10$.

- **Subtask 3** [**40 points**]: $12 \leq N \leq 1000$, $M = 12$, $1 \leq S \leq 10$, $1 \leq T \leq 10$.

Examples

INPUT	OUTPUT
1 14 10 1 CRY MOB FOR MOB MOB WEB MSC WEB CRY WEB 1 WEB 98 2 FOR 14 3 MSC 82 4 MSC 9 5 OSI 90 6 FOR 52 7 MSC 95 8 NET 85 9 REV 46 10 CRY 16 11 MOB 32 12 PWN 41 13 CRY 59 14 CRY 34	370

Explanation

The example asks for 2 crypto players (`CRY`, pun intended), 3 mobile players (`MOB`), one forensics (`FOR`), 3 web (`WEB`) and 1 misc (`MSC`). In this case, we can simply pick the top players for each category to fill the team. Since there are only one mobile and one web players in the candidates, we fill the other two spots with random remaining players, counting as 0 in the global score.