11 All-SAT is no SAT

Time Limit: 4 seconds
Memory Limit: 400 MB

Poor Sarah is building the department's course schedule. She has to consider demands from faculty, including their preferred courses, preferred class meeting times, enrollment, TAs, etc. There are F faculty members and S course sections, and each section must be assigned to exactly one faculty member.

Each faculty member F_i has a maximum teaching load L_i, a set of preferred meeting slots, a set of preferred course IDs, an ideal enrollment, and a desired number of teaching assistants (TAs). Each section S_j has a course ID, a meeting slot ID, an enrollment, and a TA count. Some faculty–section pairs are forbidden, meaning that the corresponding faculty member may not teach that section. A valid schedule must satisfy all of the following:

- Every section is assigned to exactly one faculty member.
- Faculty member F_i is assigned at most L_i sections.
- No faculty member may be assigned two sections with the same meeting slot.
- Forbidden faculty–section pairs may not be used.

Among all valid schedules, choose one that is lexicographically optimal according to the following priority order: meeting slot, course, enrollment, and then TAs. Sarah must maximize, in order

1. the total number of preferred meeting-slot assignments;
2. subject to that, the total number of preferred course assignments;
3. subject to that, enrollment satisfaction;
4. subject to that, TA satisfaction.

11.1 Input

The first line contains two integers F and S, $10 \leq F \leq 100$ and S $10 \leq S \leq 200$, representing the number of faculty and coursse sections, respectively. The next five lines are repeated once for each faculty member i ($1 \leq i \leq F$):
L_i
`kt` t_1 t_2 ... tk_t
`kc` c_1 c_2 ... ck_t
`idealEnrollment desiredTA bi` s_1 s_2 ... sb_t
where
L_i is the maximum number of sections faculty member i may teach.
`kt` is the number of preferred meeting slots, followed by their IDs.
`kc` is the number of preferred course IDs, followed by their IDs.
`idealEnrollment` is an integer that indicates how many students the faculty member prefers in their course
`desiredTA` is an integer from 0 to 3.
`bi` is the number of forbidden sections for faculty member i, followed by 1-based section indices.
The next S lines describe the sections:
`courseID slotID enrollment TAcount`

11.2 Output

If no valid schedule exists, print:
`IMPOSSIBLE`
Otherwise print:
`OPTIMAL`
`f1`
`f2`
`...`
`fS`
where f_j is the 1-based index of the faculty member assigned to section j. Any lexicographically optimal valid schedule may be output.

11.3 Constraints

$$1 \leq Li \leq 5$$

$$S \leq$$

$$0 \leq desiredTA, TAcount \leq 3$$

$$1 \leq enrollment, idealEnrollment \leq 1000$$

The total number of forbidden faculty–section pairs does not exceed 5000
Course IDs and slot IDs are positive integers

11.4 Sample Input/Output

Sample Input	Sample Output
3 5	OPTIMAL
2	1
2 1 2	1
2 101 102	2
40 1	3
1 5	2
2	
2 2 3	
1 103	
60 2	
1 2	
1	
1 1	
2 101 103	
35 0	
0	
101 1 45 1	
102 2 40 1	
103 2 60 2	
101 3 30 0	
102 1 50 1	