L. Level Up

Time limit: 2 seconds
Memory limit: 256 megabytes

Steve discovered a new RPG video game he really wants to play. This game is unique: players who can finish it optimally get their money back for the game! What a world for Steve to live in!

The game has n realms. The player starts in realm 1, with level 1 and a chosen quantity of hit points.

Each realm has a number of mobs, each with a specific strength. In each realm, the player should choose to engage and fight **one non-empty subset** of the mobs present in that realm. The fight happens in a turn-based combat system. First, all alive monsters attack, each of them yielding a damage to the player equal to its strength. Then, the player chooses one of the engaged mobs and kills it (that mob won't attack the player ever again). Every kill levels up the player (up to level m).

Once all the engaged mobs in realm i are dead, the player heals h_l hit points (where l is its level after killing all the mobs) and advances to realm $i+1$. Advancing from realm n will **finish the game**. There is no limit on the number of hit points the player can have in the play-through.

Steve's goal is to **finish the game at the maximum level** m without ever having 0 or less hit points on its play-through. Steve must play optimally, meaning that he needs to choose the minimum starting quantity of hit points possible such that he can **finish the game with max-level**.

Input

The first line of the input contains two integers n ($1 \le n \le 100$) and m ($1 \le m \le 50\,000$) — the number of realms, and the maximum level achievable in the game, respectively.

The second line of the input contains m integers $h_1, h_2, \ldots, h_m$ ($1 \le h_1 \le h_2 \le \ldots \le h_m \le 10^6$) — the number of hit points the player gets healed, based on its level.

Finally, the next n lines describe the n realms. The i-th of these lines contains a number k_i ($1 \le k_i \le 2000$) of mobs in realm i, followed by k_i integers $s_{i,1}, s_{i,2}, \ldots, s_{i,k_i}$ — the strengths of each of the k_i mobs.

All strengths are between 1 and 10^4 inclusively. Moreover, it is guaranteed that there are at least $m-1$ mobs in the entire game.

Output

Output a single positive integer — the minimum starting health possible.

Example

standard input	standard output
3 4 1 2 10 11 3 6 2 3 2 11 12 4 9 11 10 5	9

Note

Steve enters the first realm with 9 HP. He engages the mobs with 2 and 3 strength. He starts the fight by taking $2+3=5$ damage, then kills the mob with 3 strength, takes another 2 damage, and kills the remaining mob. It gains level 3 in the process, gets healed $h_3 = 10$ HP and advances with 12 total HP.

In the second realm, Steve engages the mob with 11 strength, takes 11 damage, and kills it. He is now level 4, therefore he gets healed $h_4 = 11$ HP and advances with 12 total HP.

In the third realm, Steve engages one of the mobs (no matter which one), takes damage, kills it (without levelling up), and finishes the game at the maximum level 4.