3795 - Against Mammoths

Asia - Tehran - 2006/2007

Back to year 3024, humans finally developed a new technology that enables them to conquer the alien races. The new technology made it possible to produce huge spaceships known as Saber Tooth spaceships as powerful as the aliens' defending mammoths. At that time, humans ruled several planets while some others were under control of the aliens. Using Saber Tooth ships, humans finally defeated aliens and this became the first Planet War in history. Our goal is to run a simulation of the ancient war to verify some historical hypotheses.

Producing each spaceship takes an amount of time which is constant for each planet but may vary among different planets. We call the number of spaceships each planet can produce in a year, the *production rate* of that planet. Note that each planet has a number of spaceships in it initially (before the simulation starts). The planets start producing ships when the simulation starts, so if a planet has n ships initially, and has the production rate p, it will have $n + p$ ships at the beginning of year 1, and $n + i \times p$ ships at the beginning of year i (years are started from zero).

Bradley Bennett, the commander in chief of the human armies, decided a strategy for the war. For each alien planet A, he chooses a corresponding human planet P, and produces spaceships in P until a certain moment at which he sends all spaceships in P to invade the planet A. No alien planet is invaded by two human planets and no human planet sends its spaceships to two different alien planets.

The defense power of the alien planets comes from their powerful mammoths. Each alien planet contains a number of mammoths initially and produces a number of mammoths each year (called the production rate of the planet). When a fight between spaceships and mammoths takes place, the side having the greater number of troops is the winner. If the spaceships win, the alien planet is defeated. In case the number of mammoths and spaceships are equal, the spaceships win.

The difficulty with planning this strategy is that it takes some time for the spaceships to reach the alien planets, and during this time, the aliens produce mammoths. The time required for spaceships to travel from each human planet to each alien planet is known. The ships can leave their planets only at the beginning of years (right after the ships are produced) and reach the alien planets at the beginning of years too (right after the mammoths are produced).

As an example, consider a human planet with two initial spaceships and production rate three invading an alien planet with two initial mammoths and production rate two. The time required to travel between the two planets is two years and the ships are ordered to leave at year one. In this case, five ships leave the human planet. When they reach the alien planet, they confront eight mammoths and will be defeated during the fight.

Bennett decided to prepare a plan that destroys every alien planet in the shortest possible time. Your task is to write a program to generate such a plan. The output is the shortest possible time (in years) in which every alien planet is defeated.

Input

There are multiple test cases in the input. The first line of each test case contains two numbers H and A which are the number of planets under the control of humans and aliens respectively (both between 1 and 250). The

second line of the test case contains H pairs of non-negative integers $n_1 \; m_1 \; n_2 \; m_2...n_H \; m_H$. The number n_i is the initial number of Saber Tooth spaceships in the i -th human planet and m_i is the production rate of that planet. The third line contains A pairs of non-negative integers which specify the initial number of mammoths and the production rate of the alien planets in the same format as the second line. After the third line, there are H lines each containing A positive integers. The j -th number on the i -th line shows how many years it takes a spaceship to travel from the i -th human planet to the j -th alien planet. The last line of the input contains two zero numbers. Every number in the input except H and A is between 0 and 40000.

Output

The output for each test case contains a single integer which is the minimum time in which all alien planets can be defeated. If it is impossible to destroy all alien planets, the output should be `IMPOSSIBLE`.

Sample Input

```
2 1
2 3 0 3
2 2
2
2
0 0
```

Sample Output

```
6
```

Tehran 2006-2007