Joint Farm

An agricultural cooperative consists of m households, numbered from 1 to m, that is planning their activities for the next year to maximize their profit. This has become an annual challenge for the cooperative, as there are multiple elements that can affect the production output, such as climate, types of crops, transportation, and storage.

During the farming year, there are three farming seasons: spring, summer-fall, and winter, that are numbered from 1 to 3 in their respective order. In each season, the cooperative can assign each of the households **at most** one type of crop to grow. Based on past records, there are k viable crop types, numbered from 1 to k. During the s-th season, the i-th household can be assigned to grow the j-th crop type to produce an **agricultural product unit** that yields the profit $c_{s,i,j}$. An unassigned household does not farm during the season.

The local climate also comes with a set of constraints on transportation and storage for the cooperative. During the summer-fall season, people go directly to the farm to buy the products, so there is no cost for transportation and long-term storage. However, in the spring and winter seasons, all agricultural products are gathered and sent to the warehouse at the end of the season.

- Before sending to the warehouse, the agricultural product units are grouped into their corresponding crop types. At the end of the s-th season ($s \neq 2$), the cost to send the group of the j-th crop type is $x_{s,j}^2 \cdot w_{s,j}$, where $x_{s,j}$ is the number of the gathered units of the j-th crop type, and $w_{s,j}$ is the weight of one such unit farmed during the s-th season.
- Because of the warehouse's capacity, there is a limit on $\sum_{j=1}^{k} x_{s,j}$ – the total number of produced agricultural product units over all k types:
  - In the spring season, $\sum_{j=1}^{k} x_{1,j} \leq a$.
  - In the winter season, $\sum_{j=1}^{k} x_{3,j} \leq b$.

The final constraint for the cooperative is the farmers themselves. A household can be assigned in multiple seasons. But each of the households disagrees to farm in two consecutive seasons. Because of the obvious advantage of the summer-fall season, the farmers say they would only farm in the summer-fall season and be happy with the yield.

As the number of households grows, the planning becomes more complicated for the cooperative. Therefore, the cooperative asks for your help with the calculation, so the cooperative can have a better picture before the execution. For every p from 1 to $2 \cdot m$, help the cooperative find the maximum profit and an optimal assignment if the total number of produced agricultural product units across three seasons is p (formally, $p = \sum_{s=1}^{3} \sum_{j=1}^{k} x_{s,j}$).

Input

The first line contains four integers m, k, a, b ($1 \leq m, k, a, b \leq 200$) — the number of households in the cooperative, the number of viable crop types, the warehouse's capacity during spring, and the warehouse's capacity during winter, respectively.

Then follows 3 groups of m lines. The s-th group of lines describes the profit during the s-th season:

- The i-th line contains k integers $c_{s,i,1}, c_{s,i,2}, \ldots, c_{s,i,k}$ ($1 \le c_{s,i,j} \le 10^9$) — the profit if the i-th household farms the j-th crop during the s-th season.

The next line contains k integers $w_{1,1}, w_{1,2}, \ldots, w_{1,k}$ ($1 \le w_{1,j} \le 10^9$) — the weight of one agricultural product unit of the j-th crop type farmed during the spring season.

The last line contains k integers $w_{3,1}, w_{3,2}, \ldots, w_{3,k}$ ($1 \le w_{3,j} \le 10^9$) — the weight of one agricultural product unit of the j-th crop type farmed during the winter season.

Output

Print $2 \cdot m$ groups of lines; the p-th of them describes the optimal assignment if the total produced agricultural product units in the year is p:

- If there is no way to produce exactly p agricultural product units and still follow all requirements, print `impossible`.
- Otherwise:
  - On the first line, print an integer b_p ($|b_p| \le 10^{18}$) — the maximum profit.
  - On the i-th line of the next m lines, output three integers $t_{i,1}$, $t_{i,2}$, and $t_{i,3}$ ($0 \le t_{i,s} \le k$) – the assigned crop type of the i-th household during the spring season, the summer-fall season, and the winter season, respectively; $t_{i,s} = 0$ means the household is not assigned any crop type during the s-th season.

If there are multiple solutions, you can output any of them.

Sample Input 1	Sample Output 1
2 2 2 1 5 10 10 15 2 1 3 2 6 9 24 17 18 22 23 17	3 0 0 0 0 1 0 5 0 1 0 0 1 0 -4 0 1 0 2 0 1 impossible