

Data Centers

Problem Name	DataCenters
Input File	standard input
Output File	standard output
Time limit	2 seconds
Memory limit	256 megabytes

GoncaSoft is an internet company that runs many services and has n data centers worldwide. Each data center has a number of available machines. For security and redundancy reasons, one or more copies of each service are running at the same time. Each copy runs in a separate data center, and requires a number of machines to run on. All the copies of a given service require the same number of machines.

When GoncaSoft plans to launch a new service i that requires c_i copies, each running on m_i machines, it sorts the data centers in descending order by their current available machines, and then uses m_i machines in each of the top c_i data centers.

Please calculate the remaining available machines in the data centers after launching s services in a given order.

Input

The first line of the input contains two space-separated integers n and s , representing the number of data centers GoncaSoft has and the number of new services GoncaSoft wants to launch.

The next line contains n space-separated integers, representing the number of available machines in each of the n data centers, before any services are launched.

The next s lines describe the services that will be launched: the i^{th} line contains two space-separated integers m_i and c_i , representing the number of machines and the number of copies the i^{th} service requires.

Output

Output one line containing n space-separated integers sorted in **descending order**, representing the number of remaining available machines in the data centers after all services have launched.

Constraints

- $1 \leq n \leq 100\,000$ and $0 \leq s \leq 5\,000$.
- Each data center has at most 10^9 machines initially.
- $1 \leq m_i \leq 10^9$ for each service i such that $1 \leq i \leq s$.
- $1 \leq c_i \leq n$, for each service i such that $1 \leq i \leq s$.
- The data centers will always have enough machines for the new services.

Scoring

- Subtask 1 (12 points): $n \leq 100$, $s = 0$.
- Subtask 2 (12 points): $n \leq 100$, $s \leq 10$.
- Subtask 3 (9 points): $n \leq 50\,000$, $s \leq 100$.
- Subtask 4 (26 points): Each data center has initially at most 1 000 machines.
- Subtask 5 (18 points): $c_i = 1$ for all services from 1 to s .
- Subtask 6 (23 points): No further constraints.

Example

standard input	standard output
5 4	11 10 10 9 8
20 12 10 15 18	
3 4	
4 1	
1 3	
4 2	

Explanation

Step	Available Machines	Operations
Beginning	20 12 10 15 18	
Service #1: before launching	20 18 15 12 10	Sort the data centers in descending order.
Service #1: after launching	17 15 12 9 10	Use 3 machines in each of the top 4 data centers.
Service #2: before launching	17 15 12 10 9	Sort the data centers in descending order.
Service #2: after launching	13 15 12 10 9	Use 4 machines in the top data center.
Service #3: before launching	15 13 12 10 9	Sort the data centers in descending order.
Service #3: after launching	14 12 11 10 9	Use 1 machine in each of the top 3 data centers.
Service #4: before launching	14 12 11 10 9	Sort the data centers in descending order.

Service #4: after launching	10 8 11 10 9	Use 4 machines in each of the top 2 data centers.
End	11 10 10 9 8	Sort the data centers in descending order.