# EGOI '22 P5 - Data Centers

**Time limit:** 2.0s **Memory limit:** 256M

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 Specification

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 Specification

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.

## Subtasks

- 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.

## Sample Input

```
5 4
20 12 10 15 18
3 4
4 1
1 3
4 2
```

## Sample Output

```
11 10 10 9 8
```

## 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. |