Promotion

SEASON 7 – ROUND SIX

After a lot of time spent on her boring job, Lora is finally getting close to a promotion. Lora's company has **N** different positions. An employee on position *i* gets a salary of s_i. From a given position an employee might be promoted or demotes to other positions. Formally, there are **M** possible "position changes", each of which is described by a pair **(a, b)**, denoting that an employee working on position *a* can be promoted/demoted to position *b* (this does **not** imply that an employee on position *b* can be promoted/demoted to position *a*)

Starting from a given position an employee may be moved a lot of times, both to positions with higher salaries and positions with lower salaries. Lora is now wondering for every position in the company, what is the maximal salary that can be reached by an employee starting at this position after arbitrarily many promotions/demotions (see the sample test for more information). Help Lora by calculating this value for each position in the company.

Input

The first line of the input file `promotion.in` contains two integers **N** and **M** – the number of positions and the number of possible promotions/demotions.

The second line contains N space-separated integers. The *i*-th value on this row is equal to s_i, i.e. it denotes the salary that an employee gets in position *i*.

Each of the next M lines contains a pair of space-separated integers **a**, **b** denoting that an employee on position *a* can be moved to position *b*.

Output

On a single line in the output file `promotion.out` print **N** space-separated integers. The i-th of those integers must be the maximum salary that can be reached by an employee starting on position *i*.

Constraints

$1 \leq N, M \leq 100\ 000$

$1 \leq s_i \leq 10^9$

There is no promotion/demotion that "moves" an employee to the same position.

Time limit: 1.5 sec
Memory limit: 256 MB

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Sample test

Input (towers.in)	Output (towers.out)
7 5 5 3 1 1 1 4 10 1 2 2 3 3 2 4 5 5 6	5 3 3 4 4 4 10

Clarifications

From position 1 an employee can reach positions {1, 2, 3}. From those the best salary is at position 1 and is equal to 5.

From position 2 an employee can reach positions {2, 3}. From those the best salary is at position 2 and is equal to 3.

From position 3 an employee can reach positions {2, 3}. From those the best salary is at position 2 and is equal to 3.

From position 4 an employee can reach positions {4, 5, 6}. From those the best salary is at position 6 and is equal to 4.

From position 5 an employee can reach positions {5, 6}. From those the best salary is at position 6 and is equal to 4.

From position 6 an employee can reach only position 6, which is with salary 4.

From position 7 an employee can reach only position 7, which is with salary 10