The coronavirus situation in Japan is becoming more complex since the number of infectious cases is increasing rapidly.
For the purpose of statistical investigation, there are two terms to care about: **Infectious cluster** and **Severity**

An **infectious cluster** is a group of people who have had direct or indirect contact with each other. For example, person A has direct contact with person B and C, person B has direct contact with person D. Therefore, 4 people A, B, C, D are considered to belong to the same infectious cluster.

The severity of the infectious cluster is the sum of the severity indexes of all people in a group. The greater the sum of severity indexes in a cluster, the more seriously the COVID affects social health.
The severity index of each person is specified as follows:
F0 (person who tested positive for Covid): 10
F1 (person who had direct contact with F0): 5
F2 (person who had direct contact with F1): 3
F3 (person who had direct contact with F2 or another F3): 1
Fx (person who did not have contact with F0, F1, F2 or F3): 0
If a person can be more than one F, he/she is considered to be the F with the highest severity index.
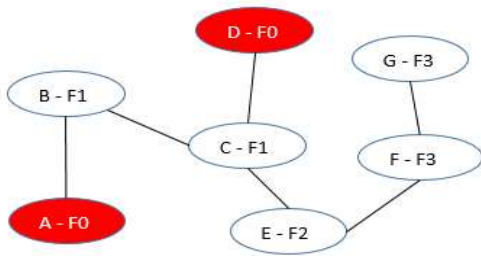
**Example:**
A, D were tested positive for COVID.
Person A had direct contact with person B.
Person C had direct contact with person B, D and E.
Person F had direct contact with person E and G.
See the illustration below:



The indexes of A, B, C, D, E, F, G are as follows:
A, D (F0): 10
B, C (F1): 5
E (F2): 3
F, G (F3): 1
The severity level of this group is: 10 + 10 + 5 + 5 + 3 + 1 + 1 = 35
**Note:**
Person C had direct contact with person B(F1) -> person C is considered as F2
Person C had direct contact with person D(F0) -> person C is considered as F1

Because F1's severity index is higher than F2's severity index, person C is F1
Given that the number of people in a cluster is $n$, the contact tracing information in that cluster is represented as a matrix $a$ and array $b$ represents the list of people testing positive for COVID.
Help the Japanese government classify $n$ people into infectious clusters and the level of severity of each cluster.
Return the result sorted in descending order.
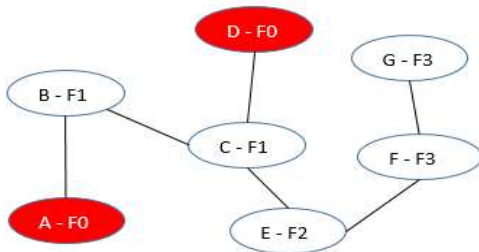


**Example**
For $n = 10$, a = [[1, 2], [1, 3], [2, 4], [4, 6], [2, 8], [6, 9], [7, 10]], b = [3, 8, 5], the output should be covidSeverity(n, a) = [35, 10, 0].
Explanation:
$n = 10$ -> the number of people in the given area is 10.

a = [[1, 2], [1, 3], [2, 4], [4, 6], [2, 8], [6, 9], [7, 10]] ->The 1st person was exposed to the 2nd and the 3rd person; the 2nd had direct contact with the 4th and 8th person; the 4th person had direct contact with the 6th person; the 6th person had direct contact with the 9th person; the 7th person had direct contact with the 10th person.

b = [3, 8, 5] -> the 3rd, 8th and 5th person tested positive for COVID

Below is the diagram of contact tracing of people in the cluster:
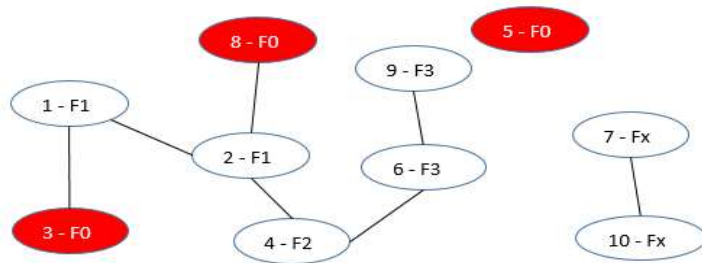


We have 3 infectious clusters:

(3-F0, 1-F1, 2-F1, 4-F2, 6-F3, 9-F3, 8-F0) with the level of severity is 35

(5-F0) with the level of severity is 10

(7-Fx, 10-Fx) with the level of severity is 0

The final result is covidSeverity(a,b) = [35, 10, 0]

**[Input] Integer n**

The number of people in a residential area.

1 <= n <= 5000

**[Input] Matrix.Integer a**

The contact tracing information of people

0 ≤ a.length ≤ 10000

a[i].length = 2, a[i] represents the index of 2 people who have contact with each other (1-based indexing), the data can be duplicated.

1 <= a[i][0], a[i][1] <= n

a[i][0] <> a[i][1]

**[] Array.Integer b**

The index of people who tested positive for COVID

0 <= b.length <= n

1 <= b[i] <= n

**[Output] Array.Integer**

The list of the severity levels of the given infectious clusters which are sorted in descending order.


**TEST CASE**

10,[[1, 2], [1, 3], [2, 4], [4, 6], [2, 8], [6, 9], [7, 10]],[3, 8, 5] => [35, 10, 0]

10,[[10,7],[3,6],[2,10],[5,6],[10,8]],[4,9,2,8] => [28,10,10,0,0]

10,[[9,4],[6,7],[2,8],[3,10],[8,10]],[5,3,7,2] => [30,15,10,0,0]

6,[[1,5],[2,5],[1,4],[4,6]],[2,6,5] => [40,0]

6,[[1,6],[5,1],[6,4],[4,3],[5,3]],[4,3] => [33,0]