

D. Greg and Graph

time limit per test: 3 seconds

memory limit per test: 256 megabytes

input: standard input

output: standard output

Greg has a weighed directed graph, consisting of n vertices. In this graph any pair of distinct vertices has an edge between them in both directions. Greg loves playing with the graph and now he has invented a new game:

- The game consists of n steps.
- On the i -th step Greg removes vertex number x_i from the graph. As Greg removes a vertex, he also removes all the edges that go in and out of this vertex.
- Before executing each step, Greg wants to know the sum of lengths of the shortest paths between all pairs of the remaining vertices. The shortest path can go through any remaining vertex. In other words, if we assume that $d(i, v, u)$ is the shortest path between vertices v and u in the graph that formed before deleting vertex x_i , then Greg wants to know the value of the following sum: .

Help Greg, print the value of the required sum before each step.

Input

The first line contains integer n ($1 \leq n \leq 500$) — the number of vertices in the graph.

Next n lines contain n integers each — the graph adjacency matrix: the j -th number in the i -th line a_{ij} ($1 \leq a_{ij} \leq 10^5$, $a_{ii} = 0$) represents the weight of the edge that goes from vertex i to vertex j .

The next line contains n distinct integers: x_1, x_2, \dots, x_n ($1 \leq x_i \leq n$) — the vertices that Greg deletes.

Output

Print n integers — the i -th number equals the required sum before the i -th step.

Please, do not use the `%lld` specifier to read or write 64-bit integers in C++. It is preferred to use the `cin`, `cout` streams of the `%I64d` specifier.

Examples

input
1 0 1
output
0

input
2 0 5 4 0 1 2
output
9 0

input
4 0 3 1 1 6 0 400 1 2 4 0 1

1	1	1	0
4	1	2	3

output			
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17	23	404	0
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