

Oil Production Management

Input file: *standard input*
Output file: *standard output*
Time limit: 1 second
Memory limit: 2048 MB

The United States of Vespuccia (USV, for short) is a big oil producer with N provinces, numbered from 1 to N , and M unidirectional roads between them. These provinces form states. Provinces A and B are part of the same state if you can go from A to B and from B to A on the given roads.

Each province has a base production of a_i oil units per year. A state made up of c provinces whose base productions sum to s collects $s \cdot c$ oil units per year (bigger states attract higher investments, thus increasing their production efficiency, but too much investment encourages corruption, thus losing potential oil production). The production of the country is the sum of the productions of all of its states.

There are K factions in the Vespuccian government, each with an unlimited supply of members. For each state, you pick one of the factions and send one of their members there. If the member sent to a state is from faction i , then that state loses p_i percent of its oil production due to corruption and inefficiency, producing only $\frac{100-p_i}{100}$ of it.

Input

The first line of input contains N ($1 \leq N \leq 10^5$) and M ($0 \leq M \leq 2 \cdot 10^5$). The next M lines contain 2 numbers u and v ($1 \leq u, v \leq N$), which represent a road from province u to province v . Roads are not necessarily distinct, and a road may lead from a province back to itself.

The next line contains $a_1, \dots, a_N$ ($0 \leq a_i \leq 10^6$). The next line contains the number K ($1 \leq K \leq 10^5$). The last line contains $p_1, \dots, p_K$ ($0 \leq p_i \leq 100$). All the values are integers.

Output

You should compute the average production of the country over all ways to assign members of the factions to the states.

The average production is a rational number $\frac{P}{Q}$. Print one integer, the value $P \cdot Q^{-1} \bmod (10^9 + 9)$, where Q^{-1} is the modular inverse of Q .

Example

standard input	standard output
5 5 1 2 2 3 3 4 4 5 5 2 4 1 0 0 0 2 25 75	4

Explanation

Provinces 2, 3, 4, 5 form one state, since the roads $2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 2$ let you travel between any two of them in both directions; province 1 forms a state on its own.

The state $\{2, 3, 4, 5\}$ has $s = 1 + 0 + 0 + 0 = 1$ and $c = 4$, so it collects 4 units, and the state $\{1\}$ has $s = 4$ and $c = 1$, so it also collects 4 units. A member of faction 1 leaves a state with 75% of its production, which is 3 units, and a member of faction 2 leaves it with 25%, which is 1 unit.

With 2 states and 2 factions there are 4 choices:

- faction 1 to $\{1\}$ and faction 1 to $\{2, 3, 4, 5\}$, producing $3 + 3 = 6$ units;
- faction 1 to $\{1\}$ and faction 2 to $\{2, 3, 4, 5\}$, producing $3 + 1 = 4$ units;
- faction 2 to $\{1\}$ and faction 1 to $\{2, 3, 4, 5\}$, producing $1 + 3 = 4$ units;
- faction 2 to $\{1\}$ and faction 2 to $\{2, 3, 4, 5\}$, producing $1 + 1 = 2$ units.

The average is $\frac{6+4+4+2}{4} = 4$.