Bill

Input file:	*standard input*
Output file:	*standard output*
Time limit:	6 seconds
Memory limit:	2 GB

You run a telephone company and lease VoIP carrier support from N carriers to handle all outgoing calls. Each carrier publishes a **routing cost table** consisting of rules that map a phone number prefix to a price per minute:

$$\text{(phone number prefix)} \longrightarrow \text{(call price per minute, in cents)}\,.$$

When you need to route a call to a particular destination phone number, each carrier determines the applicable rate using **longest prefix match**: among all rules whose prefix matches the beginning of the destination phone number (i.e., the phone number starts with the prefix), the rule with the longest prefix is chosen. If the same carrier shows multiple prices for the same prefix, choose the rule with the cheaper price. If no non-empty prefix matches, the carrier falls back to the rule with the empty prefix (if one exists). If no rule at all matches, the carrier cannot route the call.

Given a list of calls that your customers made today, compute the total cost you spend for all calls. For each call, you choose the carrier that offers the **cheapest** price per minute among all carriers that can route the call. If there are **multiple** carriers that can offer the **cheapest** price, the one described earlier in the input file routes the call. If no carrier can route a particular call, that call is *unrouted* (it contributes \$0 to the total).

Input

The first line of the input contains a single integer N ($1 \leq N \leq 10$), the number of carriers.

Then follows the description of each carrier, one carrier per group of lines. For each carrier, the first line contains a single integer M ($1 \leq M \leq 5 \cdot 10^5$), the number of routing rules. The next M lines each describe one rule. Each rule begins with a non-negative integer L (the length of the prefix). If $L > 0$, a string of exactly L digits (the prefix) follows after a space, then another space, then an integer P ($0 \leq P \leq 10^4$) representing the price per minute in cents. If $L = 0$, the prefix is empty and only the price P follows after the space.

After all carrier descriptions, the next line contains a single integer C ($1 \leq C \leq 10^5$), the number of calls.

The next C lines each describe a call. Each call consists of an integer T ($0 < T \leq 10^4$, the length of the call in minutes) followed by a space, then a string of digits representing the destination phone number (length between 1 and 15 digits).

It is guaranteed that the sum of M over all carriers does not exceed $2 \cdot 10^6$.

Output

Output $N + 1$ lines:

- The first N lines contain a single integer each. The i-th of these lines holds the total cost (in cents) for all calls that were routed through carrier i (i.e., carrier i was the cheapest for those calls).
- The last line contains a single integer: the number of calls that no carrier could route.

Example

standard input	standard output
2 2 3 900 200 4 9001 150 2 3 900 100 4 9001 80 3 10 900123 20 900999 5 5551234	0 2800 1

Explanation: There are two carriers. The first carrier's rules are: prefix "900" costs 200 cents/min and prefix "9001" costs 150 cents/min. The second carrier's rules are: prefix "900" costs 100 cents/min and prefix "9001" costs 80 cents/min.

- Call to "900123" for 10 minutes:
  - Carrier 1: longest matching prefix is "9001" (length 4) $\rightarrow$ 150 cents/min.
  - Carrier 2: longest matching prefix is "9001" (length 4) $\rightarrow$ 80 cents/min.
  - Cheapest: carrier 2 at 80 cents/min. Cost: $80 \times 10 = 800$ cents, attributed to carrier 2.
- Call to "900999" for 20 minutes:
  - Carrier 1: longest matching prefix is "900" (length 3) $\rightarrow$ 200 cents/min.
  - Carrier 2: longest matching prefix is "900" (length 3) $\rightarrow$ 100 cents/min.
  - Cheapest: carrier 2 at 100 cents/min. Cost: $100 \times 20 = 2000$ cents, attributed to carrier 2.
- Call to "5551234" for 5 minutes:
  - Neither carrier has any matching prefix for "5551234". The call is unrouted.

Carrier 1 total: 0 cents.
Carrier 2 total: $800 + 2000 = 2800$ cents.
Unrouted calls: 1.