4263 Early-Morning Pickup

Accelerated Computer Maintenance (ACM) is a company that aims at fixing customers' home computers as soon as possible. While other companies ask the customer to bring her/his computer to the maintenance station by herself/himself, ACM implements a rapid pickup system. After receiving the service request from the customer during work hours, ACM immediately sends out a service representative from a branch office. The representative would then go to the customer's house, pick up the computer, and drop the computer at one of the maintenance stations. ACM's customers are very satisfied with such a rapid service, and thus ACM's revenue keeps increasing.

Seeing the success story of ACM, many other companies are starting to implement their own rapid pickup systems as well, and ACM faces a strong competition from those companies. Thus, ACM decides to improve its rapid pickup system by including early-morning pickup routes. That is, after gathering the service requests from customers during the night, ACM asks some of its service representatives to complete the pickup tasks on their ways to work. To share the loads, each representative only needs to pick up at most one computer. If a representative is selected to stop by a customer's house for the morning pickup task, she/he would start from her/his own house, and orderly go to the customer's house, one of the maintenance stations, and her/his office. Otherwise, she/he directly goes to the office.

To implement such a system, ACM models the city as a network. The representatives' houses, the customers' houses, the maintenance stations, and the branch offices are all parts of the nodes of the network. When two nodes A and B are connected by a road, ACM computes the time needed to travel from A to B in minutes. ACM, as its name suggests, is a company that highly values efficiency. Thus, it would like to implement a system that directs its representatives to arrive at the office as early as possible. Assume that all representatives leave their houses on `08:00` in the morning. Could you compute the minimum average time that all the representatives would arrive at the office while finishing all the morning pickup tasks?

Technical Specification

1. The number of nodes V is no more than 512; the nodes are labeled by $\{1, 2, \ldots, V\}$; the number of edges E is no more than $\frac{V(V-1)}{2}$.
2. The number of representatives R, the number of customers C, and the number of maintanance stations M are all positive integers. In addition, $C \leq R$.
3. The representatives' houses, the customers' houses, the maintenance stations, and the offices are all different nodes within the network.
4. There is at least one route (linked roads) that connects any of the two maintenance stations (so they can share tools).
5. For each customer's house, there is at least one route that connects it to one of the representative's houses.
6. For each customer's house, there is at least one route that connects it to one of the maintenance stations.
7. For each representative's house, there is at least one route that connects it to her/his office.
8. Every road is bi-directional. That is, a road between A and B can be used to travel both from node A to node B and from node B to node A using the same number of minutes T, which is a positive integer and is no more than 16.

Input

The first line of the input file contains an integer indicating the number of test cases to follow. The first line of each test case contains two integers 'V E' separated by a space. Each of the following E lines would contain three integers 'A B T' separated by spaces, which indicates that nodes A and B are connected by a road with a T-minutes traveling time.

After those E lines, there would be a line with a single integer R. Each of the following R lines contains two integers 'r d', where r is the node of the representative's house, and d is the node of the representative's office.

After those R lines, there would be a line with a single integer C. The next line contains C integers c, each representing the node of a customer's house. In the next line, there is a single integer M indicating the number of maintenance stations. Then, the final line contains M integers m, each representing the node of a maintenance station.

Output

For each test case, output the minimum average time that all the representatives can arrive at the offices while finishing all the pickup tasks. The time is represented by the hour, a colon, and the minute. The hour part would be either '`08`', '`09`', '`10`', or '`11`'; the minute part is a zero-padded two-digit integer within {`00, 01, ···, 58, 59`}. The average time would be rounded up to the closest integer minute above. For example, if the average number of minutes is 25.03, it is rounded up to 26.

Sample Input

```
2
8 10
1 2 1
2 3 1
3 5 1
4 2 6
4 5 3
4 7 7
5 7 4
5 6 2
7 8 5
6 3 2
2
6 1
7 8
1
4
2
2 3
8 10
1 2 1
2 3 1
3 5 1
4 2 6
4 5 3
4 7 7
5 7 4
5 6 2
```

```
7 8 5
6 3 2
2
6 1
7 8
2
4 3
1
2
```

Sample Output

```
08:08
08:14
```