

acm International Collegiate Programming Contest



# C: Museum Guards

A museum has hired some guards and is trying to build a schedule for them. The museum would like to build a 24-hour schedule for the guards, such that:

- Each guard works during the same time intervals every day.
- Each guard works within his/her time windows of availability, which s/he specifies.
- Each guard works at most the amount of time s/he is able, which s/he also specifies.
- The guards can only shift (start or stop working) on half hour boundaries. (e.g. 04:00 or 04:30, but not 04:15).
- The guards are only scheduled for shifts if they are available to work at all times during those shifts. (e.g. if a guard's window of availability opens at 03:05, they cannot be scheduled at 03:00.)
- The minimum number of guards on duty at any time during the day is maximized. This improves security of the museum.

Write a program to help the museum staff determine the maximum number of guards that they can maintain at all times throughout a 24-hour day, given the constraints of the guards' availability. You may assume that guard exchanges are instantaneous. That is, if 2 guards leave and 2 other guards arrive at the same time, the museum is guarded by 2 guards through this exchange.

## Input

There will be multiple test cases. Each test case begins with a line containing a single integer **n**  $(1 \le n \le 50)$ , the number of guards available. There will then be **n** blocks of data, one for each guard.

Each block provides the preferences of one guard. A block begins with two integers,  $\kappa$  ( $1 \le \kappa \le 50$ ) and M ( $1 \le M \le 1440$ ), in that order;  $\kappa$  is the number of time intervals specifying when the guard is available for work, and M is the maximum number of minutes s/he is able to work each day. The next  $\kappa$  lines each contains the starting and ending time, in that order, of a time interval where the guard is available, separated by whitespace. These time intervals may overlap. The *union* of all  $\kappa$  time intervals provides the complete set of times at which the guard is available.

A starting or ending time is formatted as  $HH:MM (00 \le HH \le 23, 00 \le MM \le 59)$ . Midnight is represented by 00:00. When the ending time is smaller than the starting time, it means the guard is available for working past midnight. For example, the interval "23:00 03:00" means the guard is available from 11pm at night to 3am in the morning. If the starting and ending times are equal, then the

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guard is available for work during any time intervals throughout the day. The last test case is followed by a line with a single **0**.

## Output

For each test case, output a single integer, representing the minimum number of guards on duty at any given time during the day, using a schedule that maximizes this value. That is, output the largest integer k, such that there is a schedule where at any given moment, there are k guards on duty at the museum, assuming instantaneous exchanges specified above. Do not print any blank lines between answers.

### Sample Input

3 1 540 00:00 00:00 3 480 08:00 10:00 09:00 12:00 13:00 19:00 1 420 17:00 00:00 5 1 720 18:00 12:00 1 1080 00:00 23:00 1 1080 00:00 20:00 1 1050 06:00 00:00 1 360 18:00 00:00 3 1 1440 00:00 00:00 1 720 00:00 12:15 1 720 12:05 00:15 0

## Sample Output

1 2 1

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