第一次书面作业

1. （递推方程求解与证明）

求 $T(n) = 2T(n/2) + n/\log n$ 的解，并用代入归纳法证明。

2. （递推方程求解与证明）

求 $T(n) = 3T(n/2) + 4T(n/4) + n$ 的解，并用规范的代入归纳法证明之。

3. （递推方程的证明）

证明 $T(n) = T(\lceil n/2 \rceil) + 1$ 的解是 $O(\log n)$（注：不能直接使用主定理）。

4. （主定理）

事实上，对于主定理的情形 3，如果存在常数 c<1，使得对于所有充分大的 n 都有 $af(n/b) \le cf(n)$，则蕴含着$f(n) = \Omega\left(n^{\log_b a+\varepsilon}\right)$，正确吗？ 请简要说明。

5. （问题形式化）1534:Terrorist Attack

描述

The USA Computer Security Office claims that the terrorist attack on 11th of September could not be scheduled without the help of scheduler programs that minimize the period of hijacking 4 planes and tower crashing. To check this claim, Information Ministry decided to write such a program and check if the result of the program is the same as the hijacking plan on September 11th. Terrorist's plan is to hijack some planes, immediately after take off and redirect them in order to hit the target towers. Each hijacked plane can be used for hitting at most one tower. The program input is the scheduling of the flights, and the position of main US towers. It's supposed that terrorists want to damage at least d towers and they want to minimize the period between the first and the last tower crash.

输入

The input consists of several test cases. In the first line of each test case there are 4 numbers *n*, *k*, *p*, *d* which are the number of airports, towers, planes and minimum expected number of towers to be damaged, respectively. In the I'th line of the next *n* lines there are two integers *x* and *y* indicating the position of the I'th airport. Then, in the I'th line of the next *k* lines the re are two integers *x* and *y* indicating the position of the I'th tower and finally in the I'th line of the next *p* lines there are 5 integers *h*, *m*, *f*, *t*, *s* indicating that the I'th plane leaves the airport *f* to airport *t* at time *h*:*m*(hour and minute of the flight) with speed *s* kilometers per second. The test case with *n*=*k*=*p*=*d*=0 represent the end of input file. All coordinates are in kilometer. (*n*<=50, *k*<=50, *p*<=90)

输出

In the output, for each test case except the one with *n*=*k*=*p*=*d*=0 in a separate line write the minimum time (in the format of *h*:*m*) which is the period between the first and the last crash when at least *d* towers are damaged. If the period has seconds, round it to the nearest minute. If there is no such interval write "Impossible!" in the output file.

6. （问题形式化）1564:Sum It Up

描述

Given a specified total *t* and a list of *n* integers, find all distinct sums using numbers from the list that add up to *t*. For example, if *t* = 4, *n* = 6, and the list is [4, 3, 2, 2, 1, 1], then there are four different sums that equal 4: 4, 3+1, 2+2, and 2+1+1. (A number can be used within a sum as many times as it appears in the list, and a single number counts as a sum.) Your job is to solve this problem in general.

说明：请使用尽可能简洁且形式化的形式描述问题，并将形式化的问题与原问题建立起来直观的联系。