HW1:

Announce March 25

Due April 8

Problem 1. (20%) Tower of Hanoi.

Problem description:

Please refer to the wiki page http://en.wikipedia.org/wiki/Tower_of_Hanoi

Input: number of disks

Output: the moving steps to complete the job

1. ***Write down your algorithm (in pseudo code) to solve the problem.***
2. ***Please prove correctness of your algorithm.***
3. ***What is the complexity of your algorithm***
4. ***Write a complete computer program to solve the problem.***

Problem 2. (20%) Tiling problem. (The problem is courtesy of Prof. Tsai of NTU/CSIE from his homework sets)

Problem description:

Assume that *n* is a positive integer which is a power of two. We have a chessboard which is of size *n* x *n* with a randomly selected single tile taken away (see Figure 1(a)). You are asked to cover the entire chessboard with the piece shown in Figure 1(b). For example, see Figure 1(c). Note that the piece can be rotated. All the tiles on the chessboard except the one taken way have to be covered, and no tiles can be left outside of the chessboard. In this problem, we ask you to design an algorithm to solve this problem with the divide-and-conquer strategy. Analyze the running time of your algorithm by using the recurrence.

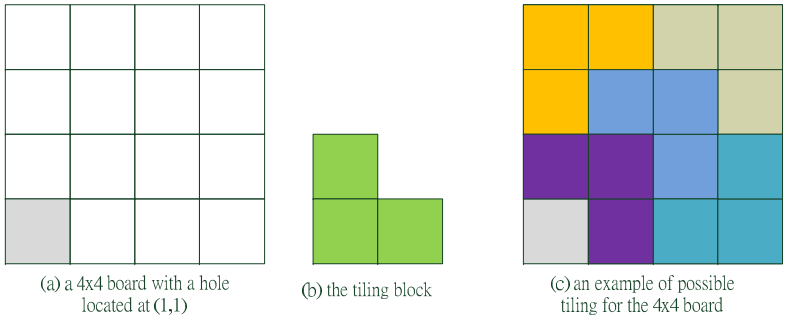

Fig 1. The tiling problem

Input: board size n (n should be a number of power of 2), and the position of the hole on the board

Ouput: your tiling procedure to complete the job

1. ***Write down your algorithm (in pseudo code) to solve the problem.***
2. ***Please prove correctness of your algorithm.***
3. ***What is the complexity of your algorithm***
4. ***Write a complete computer program to solve the problem.***

Problem 4. (40%) Solve the following problems on the textbook:

1. (10%) 4.4-6 on p.93 (3ed)
2. (10%) 4.4-8 on p.93 (3ed)
3. (20%) Use the master theorem to solve the recurrence in 4-1 (c,d,e,f) on p.107. (3ed)

Problem 5. (20%) Solve Problem 4-6 on p.110-111 of the textbook (3ed).