Fundamental Algorithms, Assignment 2
Due, Wednesday, June 04, 2008

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This assignment is about recursion and solving by divide and conquer. For all the following problems, give recursive solution (even if better iterative solution exists), prove correctness by induction, solve runtime using recurrence.

1. **CLRS (Page 85): Problems 4-2 : Finding the missing integer**

2. **Tiling with L-shaped tiles**: We are given a square chess-like board of size $2^k$ by $2^k$. One of $2^{2k}$ unit-squares in the board is broken. We are required to cover the remaining part by L-shaped tiles of size 3. An L-shaped tile is obtained by removing any of the 4 unit-squares from a 2 by 2 square tile.

   Try to reduce this problem to 4 sub-problems. The division into sub-problem is similar to the division of a square matrix in 4 parts (as we saw in Strassen’s algorithm).

3. **Maximum Subsequence sum**: We have an array (or sequence) of integers (not necessarily positive). We are required to find a contiguous sub-array (or subsequence) for which the sum of elements in it are maximized.

   Try to reduce this problem to 2 sub-problems (like in merge-sort). The subsequence you are looking for are either fully contained in the sub-problems or is made of some suffix of one part and some prefix of the other part.

4. **CLRS (Page 87): Problems 4-6: VLSI chip testing** If you did the parts (b) and (c) correctly in the last assignment, you don’t have to do this. Otherwise, you can resubmit your solution.