CS5351.0501/0502, Summer I, 2009
Parallel Processing
Assignment 2

Issued: 06/22/2009
Due: 06/29/2009

1. (20 pts) We have studied the graph coloring problem with a PRAM algorithm that takes time $O(n^2)$. Propose a strategy that can improve the time complexity of the discussed version of the PRAM algorithm. Please describe in Pseudo code if possible.

2. (25 pts) We have studied six PRAM algorithms in Lecture 2 and eleven processor organizations in Lecture 3. For each of the six problems that was solved using PRAM model, which of the eleven processor organizations may be best suitable to solve it, which of the eleven may be the least suitable to solve it? You do not have to give pseudo code. Just provide short intuitive argument.

3. (20 pts) Given is a shuffle-exchange network consisting of $n = 8$ nodes. Assume that initially node i is holding an integer value i, $0 \leq i \leq n - 1$. Show the steps (shuffle and/or exchange) needed to reach a state where node i is holding integer value $n - 1 - i$, $0 \leq i \leq n - 1$.

4. (25 pts) Consider the prefix sum problem. In Lecture 2 we discussed CREW PRAM model based prefix sum problem. Now you have just studied nine different processor organizations. Describe an algorithm on the hypercube organization for prefix sum. You can try to convert the PRAM algorithm. Ideally you can write your algorithm in the Pseudo code. If you cannot do that, you can just describe it in English.