ICS 643: Parallel Algorithms
Homework 2
Due: Wednesday, November 2, 2016, at the start of lecture

Instructions: You may discuss the problems with other students in the class, but you must write up the solutions on your own and give credit to the students with whom you discussed each problem.

1 Multi-broadcast on EREW PRAM (Exercise 2.26 in JáJà) - 30 pts

Let $B = (b_1, b_2, ..., b_k)$ be a sequence of elements stored in the global memory of an $n$-processor EREW PRAM. Develop an algorithm to distribute a copy of $B$ to each of the local memories of $n$ processors in $O(\log n)$ time, assuming $k = O(\log n)$.

2 Searchng a 2-3 Tree on EREW PRAM (Exercise 2.28 in JáJà) - 40 pts

Let $T$ be a 2-3 tree with $n$ leaves. You wish to search for a given set of $k$ elements in $T$, where $k < n$. Show how to accomplish this search in $O(\log n)$ time and $O(k \log n)$ work on the EREW PRAM model.

3 Pipelined mergesort (Exercise 4.22 in JáJà) - 30 pts

Prove that for any stage $s \geq 1$, and for any arbitrary node $v$ of the binary complete tree $T$, $|L_{s+1}(v)| \leq 2|L_s(v)| + 4$. That is the size of the list in each node at most roughly doubles in size at each stage. (Hint: use induction on $s$.)