BU CLA CS 530: Analysis of Algorithms
Spring 1995

Problem Set 10 (due Thursday 95.04.06)

---

1. Exercise 30.1-6, page 701, in [CLR]. On a binary tree with n nodes, your algorithm should run in time $\mathcal{O}(\log n)$. (Hint: Use the Euler-tour technique.)
2. Exercise 30.2-5, page 709, in [CLR]. (Hint: First define a CREW algorithm, making minor modifications in the standard serial algorithm to multiply two matrices. The standard algorithm is MATRIX-MULTIPLY at the bottom of page 554 in [CLR]; see also the bottom of page 733 in [CLR]. Your CREW algorithm should work in two phases, the first of which computes $a_{ij} \cdot b_{jk}$ for every $i, j, k \in \{1, \ldots, n\}$ in constant time. Modify your CREW algorithm into the desired EREW algorithm, using Theorem 30.1 in [CLR], page 706; you don't need to reproduce the proof of Theorem 30.1.)
3. Design an EREW algorithm to transpose an $n \times n$ matrix A in constant time. The definition of the *transpose* of a matrix is given on page 731 of [CLR].
4. Design a CREW algorithm to sort an array of $n \geq 1$ numbers in time $\mathcal{O}(\log n)$ with $\mathcal{O}(n^2)$ processors. Your algorithm can use "pairwise comparison" and "addition" as basic operations, each assumed to take one unit of time.

Created: 95.03.29
Modified: 95.03.31