

# CISC 320 010 Introduction to Algorithms (Fall 2005)

## Homework 5

Handed out: November 17, 2005

**Due date: December 6, 2005**

*Your handwriting must be legible, and your answers should be rigorous, concise and in proper order. Please note that the work handed in must be your own.*

1. CLRS 15.2-1 (Page 338) Find an optimal parenthesization of a matrix-chain product of six matrices A, B, C, D, E, F with dimensions  $5 \times 10$ ,  $10 \times 3$ ,  $3 \times 12$ ,  $12 \times 5$ ,  $5 \times 50$ ,  $50 \times 6$ . Report both the parenthesization and the cost.
2. The **partition problem** is, given a set of  $n$  nonnegative integers as input, to find a way to partition this set into two disjoint subsets so that the sums of the integers in each of the two subsets are equal. The **subset sum problem** is, given a set of  $n$  nonnegative integers and an integer  $k$  to find a subset such that the sum of the integers in the subset is equal to  $k$ .
  - a. Prove that the **subset sum problem** is in NP.
  - b. If it is known that the **partition problem** is NP-complete, prove that the **subset sum problem** is also NP-complete, by using Polynomial Reduction technique.
3. CLRS 35-1. (Page 1049)
4. Write a CREW PRAM algorithm to compute the sum of  $n$  integers in  $O(\log n)$  time.