Instructions: Submit one writeup per group; please discuss within your group – other resources including the Web are not allowed for consultation. Write your solutions neatly; write only your group ID, not your names. "DPV" refers to the version of Chapter 2 of Dasgupta-Papadimitriou-Vazirani available at http://www.cs.berkeley.edu/~vazirani/algorithms/chap2.pdf.

1. You are given an unsorted array \( A \) of \( n \) real numbers; you want to find a contiguous subsequence of \( A \) that maximizes the sum of the numbers contained. (For instance, if \( A \) is the array \((2, -3, 4, -2, 3, -1)\) with \( n = 6 \) elements, what we seek is the subarray \((4, -2, 3)\).) Show how to do this in \( O(n) \) time. \([10\text{ points}]\)

2. Suppose we have \( n \) processors in the Concurrent Read, Exclusive Write PRAM model. Given \( 2 \times 2 \) matrices \( M_1, M_2, \ldots, M_n \), show how to compute the \((n - 1)\) matrix products \( M_1M_2, M_1M_2M_3, M_1M_2M_3M_4, \ldots, M_1M_2 \cdots M_n \) in \( O(\log n) \) time. \([8\text{ points}]\)

3. Consider a Concurrent Read, Concurrent Write PRAM model where concurrent writes by many processors to the same location in the same unit of time is allowed, provided these attempt to write the same value. We are given this model and an array \( A \) of \( n \) elements, and wish to find a maximum element of \( A \).

(i) Show how to do this using \( n^2 \) processors and \( O(1) \) time. \([4\text{ points}]\)

(ii) Show how to do this using \( n \) processors and \( O(\log \log n) \) time. (Use the result of part (i) if necessary.) \([8\text{ points}]\)

4. DPV, problem 2.27. \([20\text{ points}]\)

5. DPV, problem 2.28. \([6\text{ points}]\)