Due at the start of class Tuesday, October 25, 2011.

Problem 1. Do Exercise 2 on page 246 of Kleinberg and Tardos.

Problem 2. Do Exercise 3 on pages 246-7 of Kleinberg and Tardos.

Problem 3. Assume we measure the distance between points in the plane using Manhattan Distance, where the distance between points \((x_1, y_1)\) and \((x_2, y_2)\) is \(|x_1 - x_2| + |y_1 - y_2|\). Modify the closest-pair of points algorithm for this alternative method of measuring distance.

Problem 4. Show that you can multiply matrices in \(O(n^{\log_7 7})\) time even if \(n\) is not a power of 2.

Problem 5. Consider the following greedy algorithm for solving the chained matrix multiplication problem: Look for the two contiguous matrices that can be multiplied the fastest and multiply them. Continue like this until finished.

(More formally, let the dimensions for matrices \(A_1, ..., A_n\), be given by the sequence \(<p_0, p_1, \ldots, p_n>\). Look for the two contiguous matrices \(A_i\) and \(A_{i+1}\) whose multiplication minimizes the product \(p_{i-1}p_ip_{i+1}\). Substitute \(p_{i-1}, p_{i+1}\) for \(p_i, p_{i+1}\) in \(p\). Continue like this until \(p\) consists of only two values.)

Show that this greedy algorithm does not necessarily find the optimal way to multiply a chain of matrices.