Lab06-Dynamic Programming

Exercises for Algorithms by Xiaofeng Gao, 2016 Spring Semester

Name:_____   Student ID:_____   Email: _____

1. **Maximum Value Contiguous Subsequence**: Given a sequence of n real numbers $\{a_1, \cdots, a_n\}$, determine a contiguous subsequence $\{a_i, \cdots, a_j\}$ for which the sum of elements in the subsequence is maximized. Give your algorithm and analyse it.

2. **Longest Increasing Subsequence**: Given a sequence of n real numbers $\{a_1 \cdots a_n\}$, determine a subsequence (not necessarily contiguous) of maximum length in which the values in the subsequence form a strictly increasing sequence. Give an algorithm to find the longest increasing subsequence and analyse your algorithm.

3. **Unbounded Knapsack Problem**: Given types of items of different values $\{v_1, v_2, \cdots, v_n\}$ and volumes $\{w_1, w_2, \cdots, w_n\}$, Give an algorithm to find the most valuable set of items that fit in a knapsack of fixed volume W and analyse your algorithm. The number of items of each type is unbounded.

4. **Edit Distance**: Given two text strings A of length n and B of length m, you want to transform A into B with a minimum number of operations of the following types: delete a character from A, insert a character into A, or change some character in A into a new character. The minimal number of such operations required to transform A into B is called the edit distance between A and B. Give an algorithm to find the edit distance between A and B and analyse your algorithm.