CS 5800: Algorithms | V. Pavlu, K.Lieberherr
Due: Feb. 24, 2014

Homework Module 7

1 Submission Rules

`http://www.ccs.neu.edu/home/lieber/courses/algorithms/cs5800/sp14/homeworks/submission-rules.pdf`

2 Problems

1. (20 pts) Problem 15-2.
2. (20 pts) Exercise 15.4-6. Hint: try to use the LCS problem as a procedure.
3. (20 pts) Suppose that you are the curator of a large zoo. You have just received a grant of $\$m$ to purchase new animals at an auction you will be attending in Africa. There will be an essentially unlimited supply of n different types of animals, where each animal of type i has an associated cost c_i. In order to obtain the best possible selection of animals for your zoo, you have assigned a value v_i to each animal type, where v_i may be quite different than c_i. (For instance, even though panda bears are quite rare and thus expensive, if your zoo already has quite a few panda bears, you might associate a relatively low value to them.) Using a business model, you have determined that the best selection of animals will correspond to that selection which maximizes your perceived profit (total value minus total cost); in other words, you wish to maximize the sum of the profits associated with the animals purchased.

   Devise an efficient algorithm to select your purchases in this manner. You may assume that m is a positive integer and that c_i and v_i are positive integers for all i. Be sure to analyze the running time and space requirements of your algorithm.
4. (20 points) Problem 15-4.
5. (20 points) For context see

   `http://www.ccs.neu.edu/home/lieber/courses/algorithms/cs5800/sp14/homeworks/m7/DebateEvaluationAlgorithmProperties`

   and your lecture notes.

   For the two ranking functions WC and FC determine which of the four properties: NNEW.I, NNEW.II, NPEL.I, NPEL.II hold. If a property holds, give a proof. If not, give a counterexample.