CS 466/666 Spring 2013
Assignment 2
Due Noon, Monday May 27, 2013

You are on your honour to present your own work and acknowledge your sources.

1. [8 marks: The Need for Paid Exchanges, this problem is taken in part from [BE]] In discussing Move to Front and other self-organizing heuristics the model was very important. In the model in which swapping the requested element with one immediately in front of it (and perhaps repeating this many times) as a "free exchange", bring the question as to whether "paid exchanges" are necessary to achieve the offline optimal. "Clearly" they are not necessary to come within a factor of two of optimal under this model.
    a. Show that the offline optimal to service the request a_3,a_2,a_3,a_2 is 8. The list is initially in the order a_1,a_2,a_3.
    b. Also show that the optimal offline algorithm without using these "paid exchanges" is 9

2. [6 marks] In a splay tree we use "double rotations" to move an element to the root. It was mentioned that moving the requested element to the root by a sequence can give very bad amortized behavior. Prove that this amortized cost can be $\Theta(n)$ (actually you can get it to n)for an arbitrarily long sequence of requests on a tree with n nodes, with a starting configuration of your choice. (You need not deal with either insertions or deletions.)