

**Problem Set 5**

*Due: Wednesday, October 11, 2017 at noon*

**Problem 5.1 [Ordered File Maintenance without Extra Space].**

Describe a data structure for inserting  $n$  elements into an initially empty array of length exactly  $n$  in  $O(\lg^3 n)$  amortized swaps per operation.

In other words, you're given  $n$  spots for items. Initially, each spot is empty. One at a time, you're given an item to insert into a spot and an order relative to the existing items; you may swap other items' positions if necessary. You want to perform all  $n$  inserts using  $O(n \lg^3 n)$  total swaps.