WST501: Assignment 2 (Due day May 16, 2012)

We have learned an O(k)-space structure for maintaining a sample set (without replacement) of size k in a sliding window (obviously, the sliding window must have length at least k). In this assignment, you are asked to describe an efficient implementation of the structure to satisfy the following requirements:

- The structure can be updated in O(1) amortized time when a new element arrives in the stream (i.e., the element joins the window, whereas the oldest element in the window expires).
- Whenever we need to return a sample set of size k, we should return the sample set in an array of size k in O(1) worst case time. Note that even though the array has k elements, it does not mean that we need O(k) time returning it it suffices to specify the beginning address of the array!