**Merging with smaller auxiliary array.** Suppose that the subarray a[0] to a[n−1] is sorted and the subarray a[n] to a[2∗n−1] is sorted. How can you merge the two subarrays so that a[0] to a[2∗n−1] is sorted using an auxiliary array of length *n* (instead of 2*n*)?

**Counting inversions**. An *inversion* in an array *a*[] is a pair of entries *a*[*i*] and *a*[*j*] such that *i*<*j* but *a*[*i*]>*a*[*j*]. Given an array, design a linearithmic algorithm to count the number of inversions.

**Shuffling a linked list.** Given a singly-linked list containing *n* items, rearrange the items uniformly at random. Your algorithm should consume a logarithmic (or constant) amount of extra memory and run in time proportional to *n*log*n* in the worst case.