

Due by Tuesday 9/16 at 9:00

1. Suppose that the for loop header in line 9 of Counting-Sort is rewritten as  $\text{for } j \leftarrow 1 \text{ to } \text{length}[A]$ . Show that the algorithm still sorts correctly. Is the modified algorithm stable?
2. Describe an algorithm that, given  $n$  integers in the range 0 to  $k$ , preprocesses its input and then answers any query about how many of the  $n$  integers fall into a range  $[a..b]$  in  $O(1)$  time. Your algorithm should use  $\Theta(n + k)$  preprocessing time.
3. Using Figure 8.3 as a model, illustrate the operation of Radix-Sort on the following list of English words: cow, dog, sea, rug, row, mod, box, tab, bar, ear, tar, dig, big, tea, now, fox.
4. Which of the following sorting algorithms are stable: insertion sort, merge sort, heapsort, quicksort? Give a simple scheme that makes any sorting algorithm stable. How much additional time and space does your scheme entail?