1) (10 pts) ANL (Algorithm Analysis)

Write down the **worst case run-times** for each of the requested operations. **You may assume that each operation is done with an efficient algorithm.** Please leave your answer in **simplified Big-Oh** form, in terms of the variables given in the problem. Thus, please do NOT include any leading constants or unnecessary terms. Answers such as $O(2n^2)$ or $O(n^2 + \lg n)$ **will receive no credit**, even if they are technically correct. Each part is worth 1 point.

a) Inserting **k** items, each into the front of a linked list which starts with **n** items. — $O(k)$

b) Running a floodfill on a grid with **r** rows and **c** columns. — $O(rc)$

c) Sorting **n** elements via the Quick Sort algorithm. — $O(n^2)$

d) Efficiently forming a heap out of **n** unsorted items. — $O(n)$

e) Removing all of **n** items, one by one, from a Priority Queue that originally has **n** items. — $O(nlgn)$

f) Inserting **n** items, one by one, into a Binary Search Tree. — $O(n^2)$

g) Inserting **n** items, one by one, into a AVL Tree. — $O(nlgn)$

h) Printing out the set of moves to solve the Towers of Hanoi with a tower of **n** disks. — $O(2^n)$

i) Merging two **sorted lists**, one with **r** elements, the other with **s** elements, into a single sorted list. — $O(r+s)$

j) Writing out the first 10 Fibonacci numbers. — $O(1)$

Grading: 1 pt per answer. Answer has to match exactly to get credit. Only exception is that (i) can be listed as O(max(r,s)).