1) (10 pts) ANL (Algorithm Analysis)

Determine the average case and worst case run-times, using Big-Oh notation, for the following algorithms or data structure operations. In order to earn credit, your answers must be in terms of the appropriate variables given in the question.

Algortithm/Operation	Average Case	Worst Case
Push operation onto a stack implemented with a linked list storing n elements.	O(1)	O(1)
Printing out each permutation of the integers 1, 2, 3, …, n. (Note: printing a single integer takes O(1) time.)	O(n*n!)	O(n*n!)
Insertion of a single node into a binary search tree with n nodes.	O(lg n)	O(n)
Deletion of a single node of an AVL tree with n nodes.	O(lg n)	O(lg n)
Merging a sorted array of size P with another sorted array of size Q, producing a newly allocated sorted array of P+Q elements.	O(P+Q)	O(P+Q)

Grading: 1 pt for each part, to earn the point the answer has to be perfectly correct. Please also accept $O(n^2n!)$ for the second part, as reasonable implementations could have this run time.