Data Structures Quiz 9 (20 minutes)

Name: _____ NetID: _____

By participating in this quiz, you agree to adhere to the honor code.

In this quiz, you will implement a priority queue using an AVL tree to create another $O(n \log n)$ sorting algorithm. Say you are given a structure `AVLTree` that has map methods `Entry<K, V> add(K key, V value)` and `Entry<K, V> remove(K key)` (these run in $O(\log n)$ time), tree attributes `int size` and `Position<Entry<K, V>> root`, and tree methods `Position<Entry<K, V>> getLeft(Position<Entry<K, V>> pos)` and `Position<Entry<K, V>> getRight(Position<Entry<K, V>> pos)` (if `pos` has no left or right child respectively, these methods return `null`).

Implement `AVLTreePriorityQueue` with a constructor that instantiates an `AVLTree`, and methods `Entry<K, V> add(K key, V value)` and `Entry<K, V> removeMin()`. These methods should run in $O(\log n)$ time.

Hint: Where is the element with the smallest key in a binary search tree?