Assignment 4: Graphs and Trees

Robert Perrone

robert.perrone1@marist.edu

November 14, 2020

Instructions: In your LaTeX summary and analysis document, analyze the asymptotic running time of both graph traversals and explain why it is that way. Also analyze the asymptotic running time of BST lookups and explain that as well.

1 Asymptotic Running Times

1.1 Depth/Breadth First Search

The asymptotic running time of dfs and bfs are both O(n + m). With n being the number of vertices and m being the number of edges. The time complexity of both are the same due to the same for-each loop that goes through the different neighbors in the neighbors ArrayList. This is what makes the time complexity for both what it is since the other lines of code are constant factors.

1.2 BST Lookups

The asymptotic running time of the bst search function is O(n). With n being the height of the tree. When searching for an item in the tree, at each comparison, it reduces the search space by half. Because 2 is a constant factor, we can say that the asymptotic running time is O(n).