Assignment Four – LaTeX Directed Graphs and Spice Heist

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0.1 Single Source Shortest Path

The asymptotic running time for single source shortest path is O(E + V^2) so just O(V^2). The algorithm calls both the insert and extract the minimum value once per vertex. Each vertex gets added one time, but it is examined in the for loop for each vertex. The running time for Dijkstra depends on how we implement the minimum priority. So depending on the number of vertices and edges in the graph we eventually get to our worst time, if achieved, of O(V^2).

0.2 Fractional Knapsack

The absolute worst scenario of Fractional Knapsack would take about O(nlogn) time. Initially, we have to take our run through a while loop which iterates through the entire sets of spices so that leaves us with n. After this we must sort everything leading to to the O(nlogn). I have also seen online that it is O(n*S) which the number of nodes * the number of sub problems, which would just be O(n) if I am correct. Fractional is a little weird because we are only able to take a portion of everything, unless we have already taken the entire section.