Assignment Five

Anthony Rodriguez

Anthony.rodriguez2@Marist.edu

December 5, 2020

1 Asymptotic Run Time

1. SSSP [$O(V * E)$]
   - V is the number of vertices and E are the number of edges. When the graph is traversed it results in $O(V^2)$.Upon graph completion the run time becomes $O(V^3)$ because a single vertex can be traversed more than once. This is also justified by combining the original run time with the completed run time $O(V^2)$ * $O(V * E)$. Since we do not care for the constant, in this case E, we throw it away leaving us with the above run time.

2. Fractional Knapsack [$O(nlogn)$]
   - Knapsack shares similarities with previous algorithms indicative by the division being done. If n items were already somewhat sorted, the run time of the inner loop is $O(n)$. Since the major essence of the algorithm is Price / Weight, very much like the MergeSort, this is a divide and consquer approach to a solution.