

Efficiency Analysis for Algorithm 1: Greedy Approach to Hamiltonian Problem

We will be using the step counting method to determine and prove the efficiency class of the algorithm.

All of the variables that are a part of the ‘findTheStartingCity’ function are initialized.

Because they are assigned a constant, we can infer that this is a complexity of $O(1)$.

Considering that we have to loop through the cities in the provided list, we can infer that the loop runs an n amount of times.

We let n be the number of cities.

Through our pseudocode, we show that we will iterate through the city_distances and amount of fuel list once.

Inside the loop, we show that there is an if statement; however, because there are no nested loops, the statement does not increase the complexity at all.

So with the initialization being $O(1)$ and the loop having a complexity of $O(n)$ with no further indication of an increase of complexity, it can be inferred that our complexity is:

$$O(1) + (O(n)) = O(n)$$