Task 1:

Dijkstra's algorithm using min-heap was implemented to solve task 1 and 2. Heapq was used to structure the min-heap and pop the smallest element at every loop. A prev list was created to store the vertex connected at that location in order to return the shortest path. The shortest path was found by finding the previous vertex starting at the target using the prev list looping until the vertex equals the source vertex. After the path was found it needed to be reversed into the correct order.

Time complexity consist of Dijkstras algorithm using min heap

Time Complexity: O(E Log V) where E is the amount of edges and Log V is from the min heap

Space Complexity: O(V + E) where V is the vertices and E is the edges

Task 2:

The distance for each customer in the customers list was searched and the smallest distance customer was returned. From there the distances for all target vertex was found using the dijkstras algorithm so now we have the first set of finalized to get the path leading to the customer and second set of finalized to get the path from the target vertex to the customer vertex. The get_path function was used to return the path from both list which are then added together to form the whole path.

Time complexity consist of Dijkstras algorithm using min heap

Time Complexity: O(E Log V) where E is the amount of edges and Log V is from the min heap

Space Complexity: O(V + E) where V is the vertices and E is the edges