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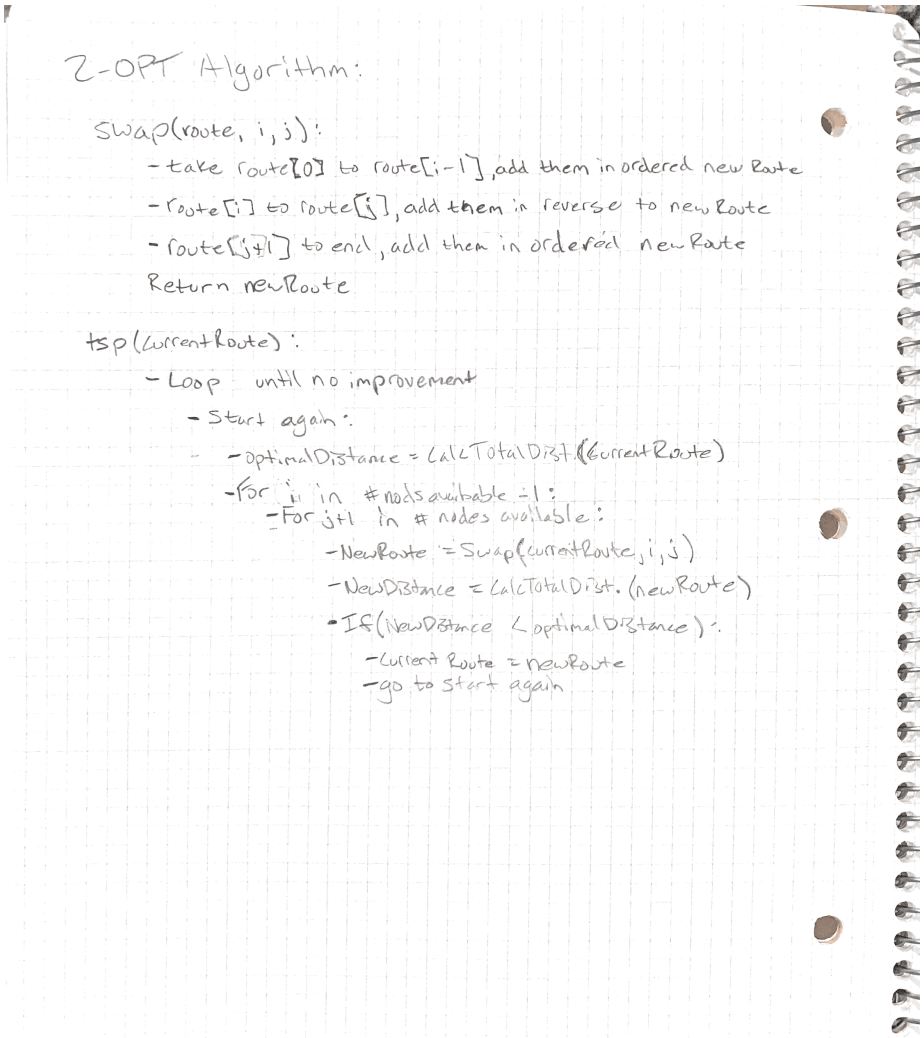
Traveling Salesman Problem

Research:

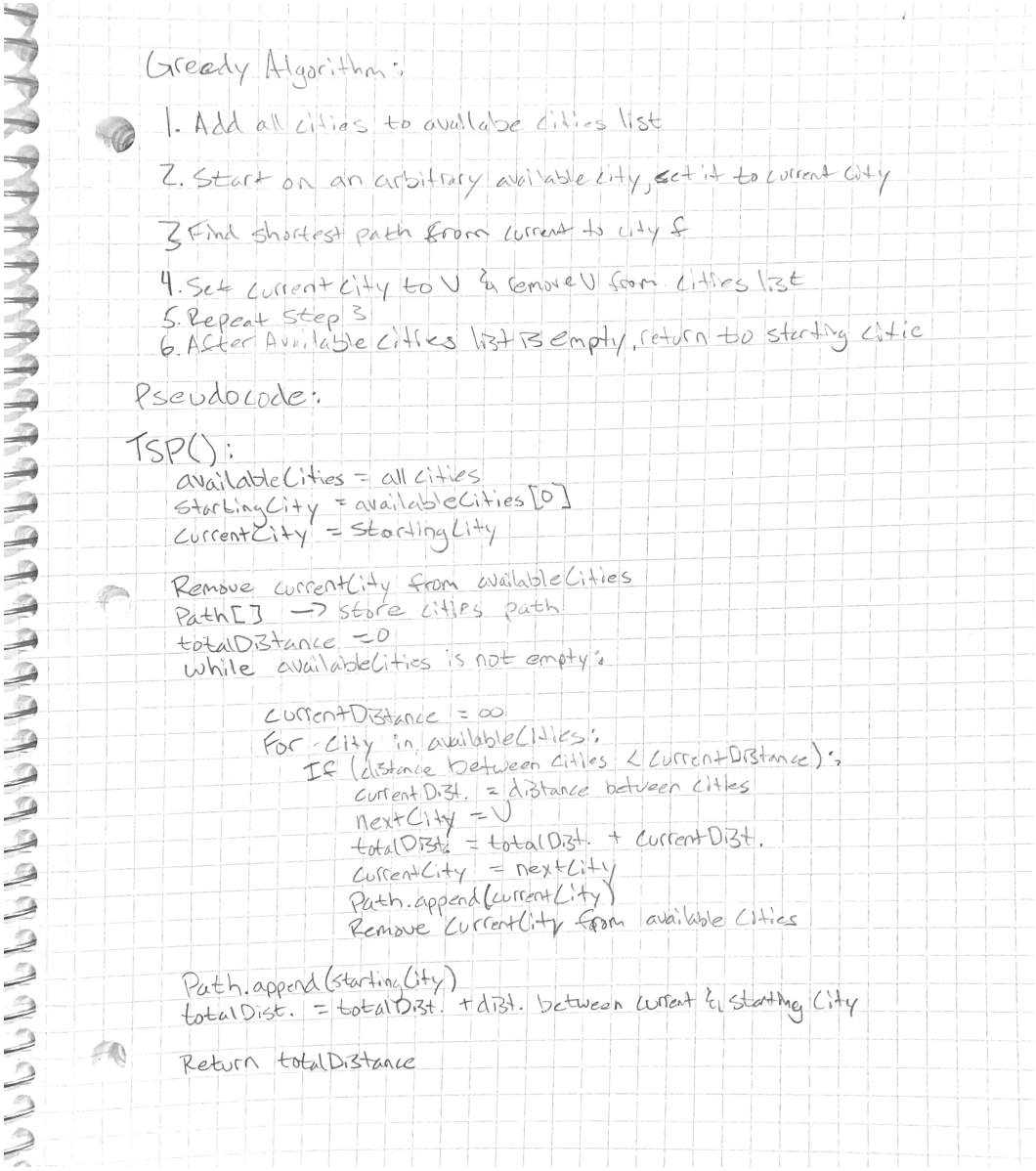
When I first started researching for this assignment I found that there are many different ways to approach the Traveling Salesman problem so I narrowed my search for algorithms that weren't too complex. I already had some background knowledge of greedy algorithms so I decided to use that but also research 2-opt algorithms. The 2-opt algorithm was made by G. A. Croes in 1958. It is a simple algorithm in which a self-crossing route is reordered so that it is not overlapping itself. Majority of the greedy algorithm I did myself although I did use the nearest neighbor algorithm as a foundation. The 2-opt algorithm was based on a lot of research and testing because I didn't know a lot about it. I chose to use it because it seemed simple and not as time consuming as others.

Pseudocode:

2-opt Algorithm:



Greedy Algorithm:



Greedy Algorithm:

1. Add all cities to available cities list
2. Start on an arbitrary available city, set it to current city
3. Find shortest path from current to city &
4. Set current city to V & remove V from cities list
5. Repeat step 3
6. After Available cities list is empty, return to starting citie

Pseudocode:

```
TSP():
    availableCities = all cities
    startingCity = availableCities[0]
    currentCity = startingCity

    Remove currentCity from availableCities
    Path[] --> store cities path
    totalDistance = 0
    while availableCities is not empty:

        currentDistance = ∞
        For city in availableCities:
            If (distance between cities < currentDistance):
                currentDist. = distance between cities
                nextCity = V
                totalDist = totalDist. + currentDist.
                currentCity = nextCity
                Path.append(currentCity)
                Remove currentCity from available cities

    Path.append(startingCity)
    totalDist. = totalDist. + dist. between current & starting city

    Return totalDistance
```

Best Tours:

Example #	Runtime(seconds)	Tour length
tsp_example_0.txt	0.00	14
tsp_example_1.txt	0.11	115057
tsp_example_2.txt	1.44	2835
tsp_example_3.txt	0.02	5639
tsp_example_4.txt	0.19	7710
tsp_example_5.txt	18.67	25230