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33 + 48

"TSO Midterm Exam"

Section 1

1 +4.5 it's an Optimization problem that have Integer values but the decisions of the problem are bolean.

2 +4.5 To solve a C.O.P with brute-force method you need to solve the problem making all the posible ~~instances~~ feasible solutions and compare them to find the optimal solution.

3 it's an algorithm that try to solve a C.O.P in a rational +2.5 amount of time.

4 +4 it's preferable to use a heuristic method when the exact optimization method takes a lot of time to solve the problem.

5 +3.5 it's a heuristic that use a greedy function to solve a problem. how?

6 +7 To solve a T.S.P problem using the nearest neighbor heuristic we need to follow the next steps:

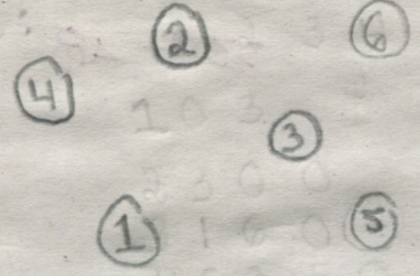
1.- Select a random city to start!

2.- Go to the unvisited city closest to the last city picked

3.- Stop the process when the tour is completed, then calculate the total distance traveled.

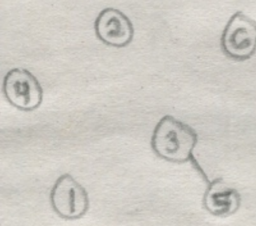
4.- Repeat the process until you find the best tour (the one with the lowest total distance traveled.

Example: We picked randomly the city number 3

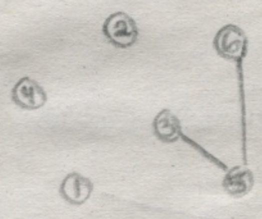


* Note: this is an example of a feasible solution.

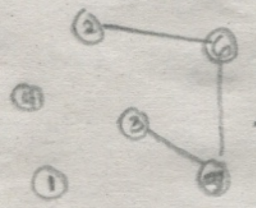
Iteration 1:



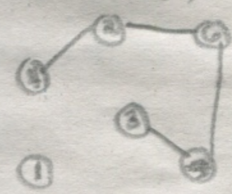
Iteration 2:



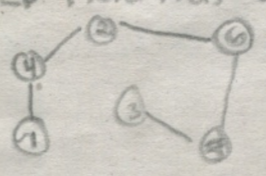
iteration 3:



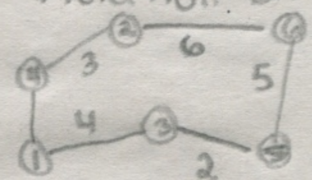
Iteration 4.



Iteration 5:



Iteration 6:



distance traveled = 2+5+6+3+4 = 20

+7

7) To solve a T.S.P with the nearest insertion heuristics we need to follow the next steps:

1- Choose a starting node and add it to the solution.

2- Find the closest node to the starting node and add it to the solution.

3- For each subsequent node to be added to the solution, find the pair of nodes in the current solution that are the closest to it.

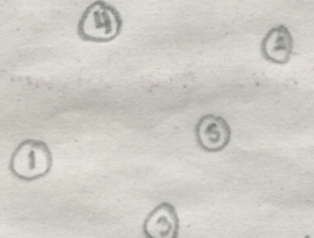
4- Select the pair of nodes that minimized the distance when the new node is inserted. (Formula: $C_{ik} + C_{jk} - C_{ij}$)

5- Insert the between the selected pair of nodes

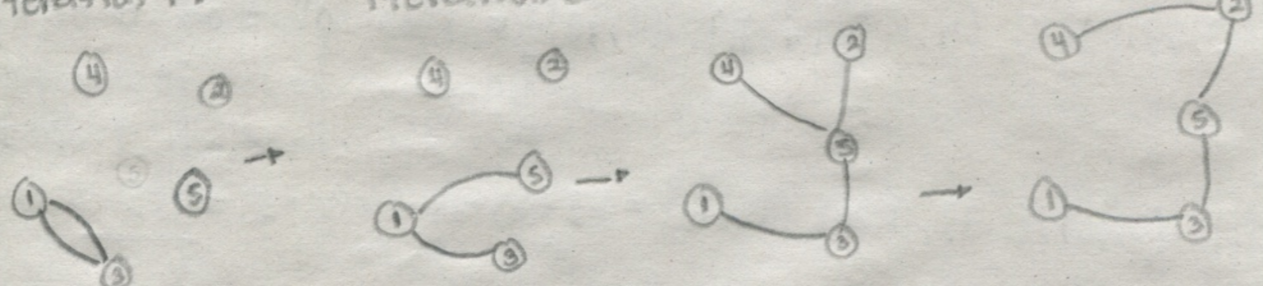
6- Repeat Step 3 to 5 until we add all the nodes.

7- Connect the last node with the initial node to get a tour and completed the solution

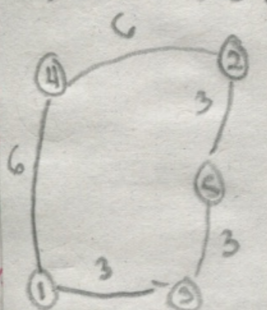
Example: We started with the node 1



Iteration 1: Iteration 2: iteration 3: Iteration 4:



iteration 5:

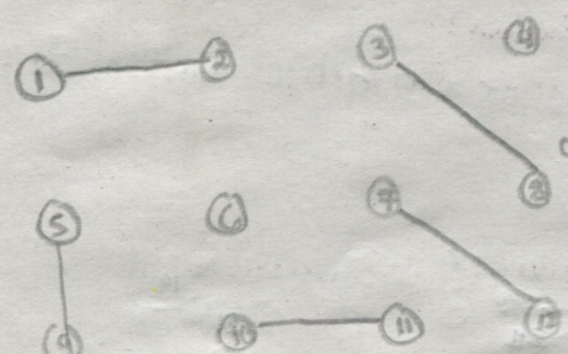


Total distance traveled = 3+3+3+6+6 = 21

8

a)

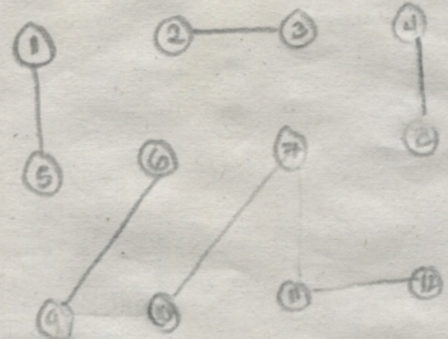
+4



A= Yes, it is a feasible solution because met the constiain which is that there are not two or more edges sharing the same node.

But it's not perfect

b)



A= Yes, its a feasible solution because it met the constrain which is that there are not two or more edges sharing the same node.

+4 (6,4) does not exist

c) +5

$M^3 = \{(1,5),(2,6),(3,7),(4,8),(7,11),(9,10)\}$ = This solution its not feasible, because it doesn't met the constrain. (node 7)

$M^4 = \{(1,2),(5,9),(6,10),(3,7),(4,8),(11,12)\} = 17+30+19+16+15+18 = \underline{115}$
47 66 82 97

$M^5 = \{(1,5),(2,6),(9,10),(3,4),(7,11),(8,12)\} = 14+14+18+19+14+26 = \underline{105}$.
28 46 65 79

A= 1= M^4, 2= M^5 M^3= its not a feasible solution
BEST so its the WORST

+21

d) To solve the MP problem using the most value edge we need to follow the next steps:

1= Find the most value edge avaible of the problem.

2= Verify that there's not a vertex conected to the node.

? Why? Explain?

3= Put a vertex which? until you put the max avaible vertex to put

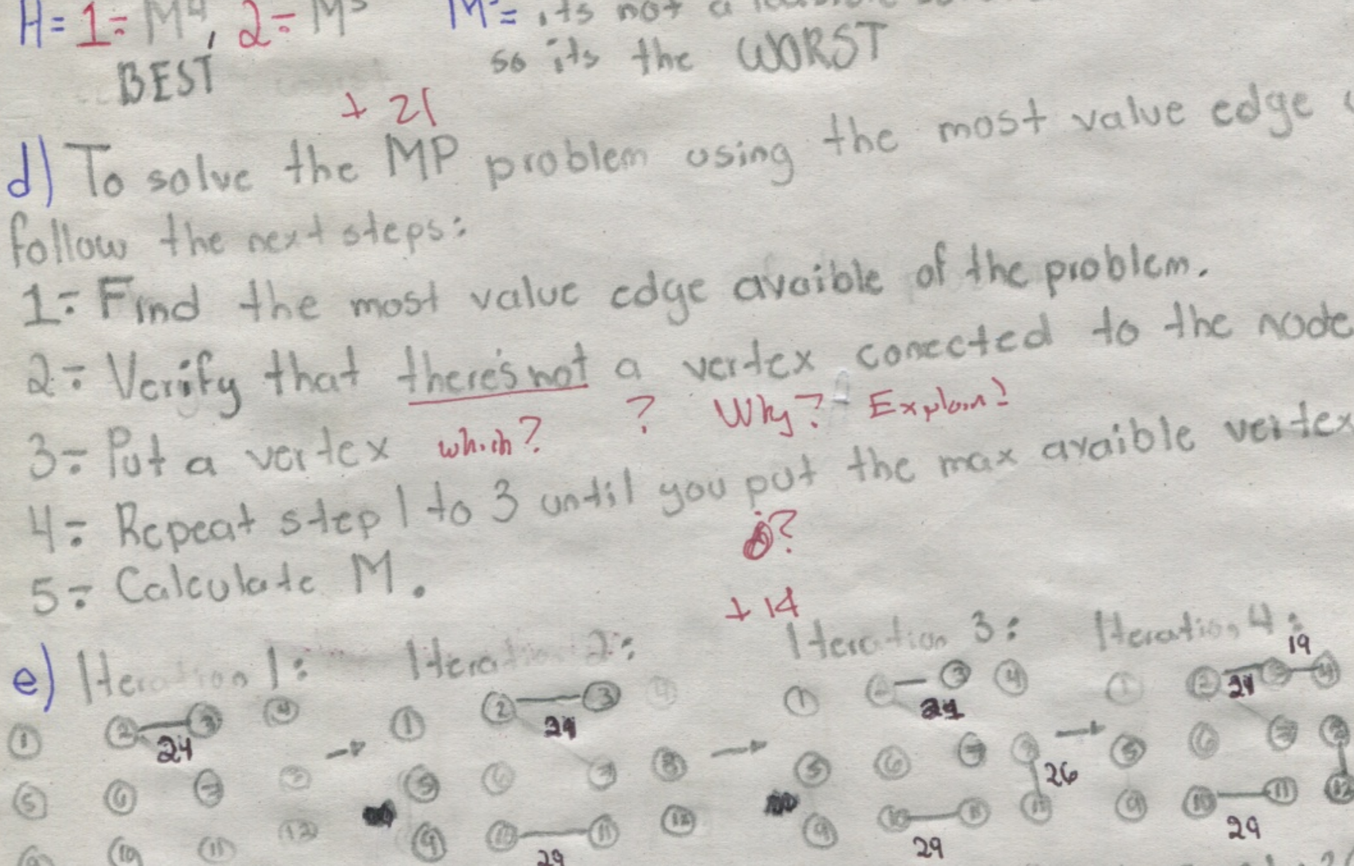
4= Repeat step 1 to 3 until you put the max avaible vertex to put

6?

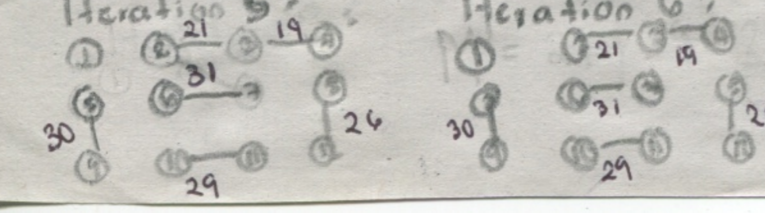
5= Calculate M.

+14

e) Iteration 1: Iteration 2: Iteration 3: Iteration 4:



Iteration 5: Iteration 6:



$M = 21+29+26+19+31+30 = 156$
50 76 95 124