Steps for transportation mode:

① Add info of plant vs warehouse
transportation mode 1 vs mode 2

S.S
- value
- space cost
- demand rate
- Production rate

cost | capacity | time.

② Begin Solving:

1- Holding costs at production plant (annual)
(space rent cost + holding cost)

space cost x max q inventory holding cost rate x value x avg q

2- Holding costs at warehouse (annual)
(space rent cost + holding cost)

*take S.S into consideration.

3- Pipeline inventory costs for transportation modes.

demand rate per year * inventory holding cost rate x avg values (of warehouse and plant) x time needed in year for mode.

* for each mode.

4- Transportation costs by mode.

cost of mode x demand rate per year / q mode

for each mode.

⇓

5- Total cost

TC_{mode} = Holding costs at production plant + ... + warehouse + pipeline inventory cost for mode

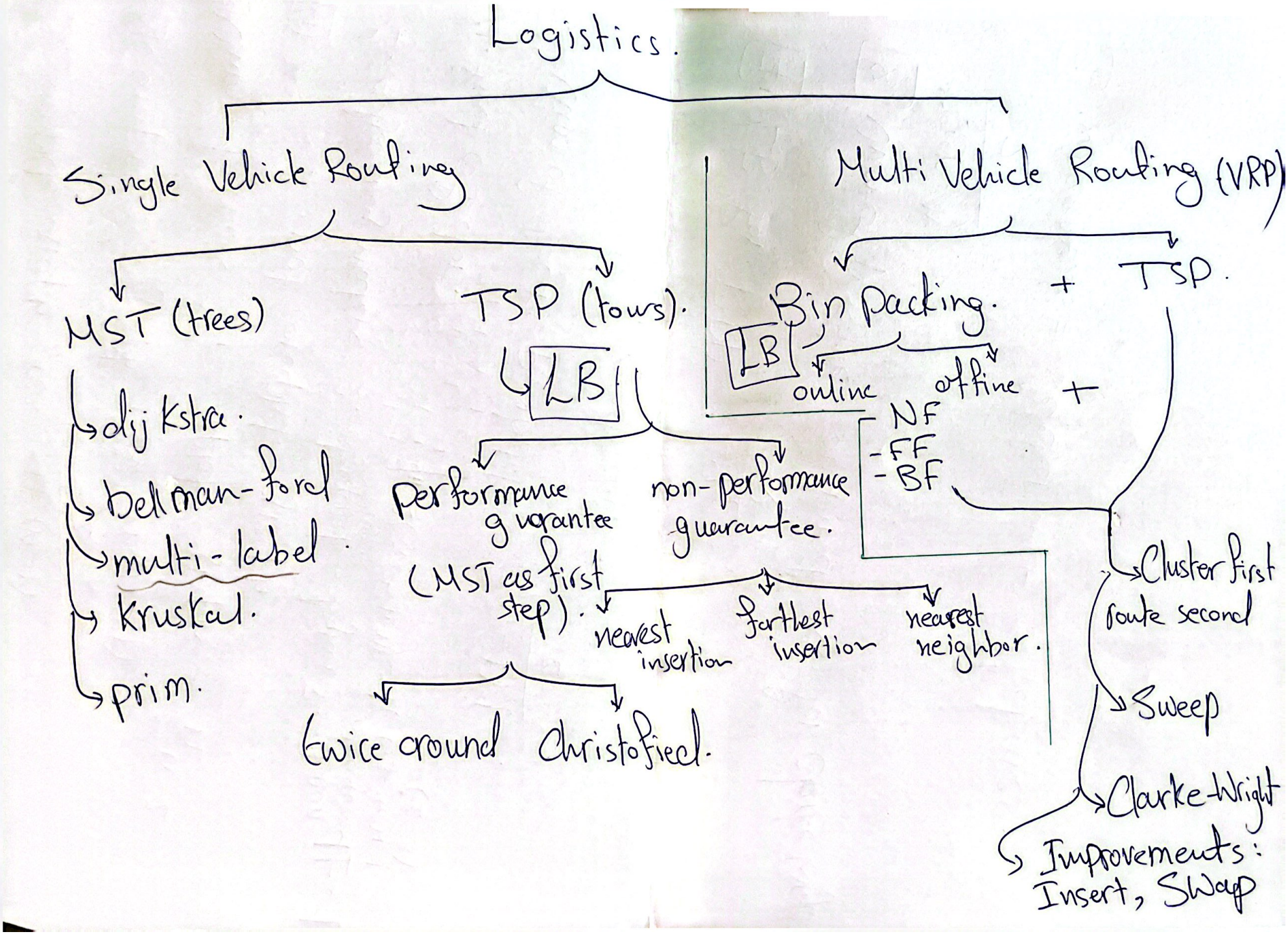
+ transportation cost by mode.

for each mode.

6- Find derivative of TC for each mode, find q_{mode} for each, with mode ثابت, ثم حل q_{mode} in TC

capacity

again, choose least cost.


Logistics.
Single Vehicle Routing
Multi Vehicle Routing (VRP)
MST (trees)
TSP (tours).
Bin packing.
+
TSP.
LB
LB
online
offline
+
NF
-FF
-BF
dijkstra.
bellman-ford
multi-label.
kruskal.
prim.
performance guarantee
non-performance guarantee.
(MST as first step).
nearest insertion
farthest insertion
nearest neighbor.
Cluster first route second
Sweep
Clarke-Wright
Improvements: Insert, Swap
twice around
Christofied.

[1] Complete graph arcs: $\frac{n \cdot (n-1)}{2}$.

[2] Complete diagraph arcs: $n \cdot (n-1)$

[3] Num of trees for complete graph = n^{n-2}.

[4] " " " not complete graph:

1. adjacency matrix 2. diagonal → degrees 3. all non-diagonal $\neq -1$

4. find cofactor. $\begin{bmatrix} 3 & 0 & -1 & -1 \\ 0 & 2 & -1 & -1 \\ -1 & -1 & 3 & -1 \\ -1 & -1 & -1 & 3 \end{bmatrix}$ $C_{11} = 2(3\times3 + 1\times-1) - -1(-1\times3 - -1\times-1) + -1(1 - -3)$

[5] Num of tours possibilities: $\frac{(n-1)!}{2}$.

[6] Bin packing constraints.

[7] LB for BPP: $\frac{\sum q_i}{Q}$.

[8] Num of possible combinations for clarke wrights:

$\frac{n \cdot (n-1)}{2}$.

[9] improvements = deleted arcs - added arcs.

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