Module 09 - Fixed Charge Problem

Exploratory Data Analysis

In this section, you should perform some data analysis on the data provided to you. Please format your findings in a visually pleasing way and please be sure to include these cuts:

- Make a visual graph of your data on a map (coordinates should be within US borders)
 - o https://mymaps.google.com/
 - Find a map with latitude/longitude and place them approximately
 - Any alternative that gives the same effect



Model Formulation

Write the formulation of the model into here prior to implementing it in your Excel model. Be explicit with the definition of the decision variables, objective function, and constraints.

MIN: 43.71X11 + 12.6X12 + 17.15X13 + 22.35X14 + 51.06X15 + 50.71X16 + 22.01X21 + 17.78X22 + 4.55X23 + 7.99X24 + 36.7X25 + 36.35X26 + 10.77X31 + 24.1X32 + 15.79X33 + 13.57X34 + 30.38X35 + 30.03X36 + 38.69X41 + 7.58X42 + 19.11X43 + 30.97X44 + 59.68X45

WH V DC > #1 43.71X11+12.6X12 + 17.15X13 + 22.35X14+51.06X15+50.71X16 <= 620

WH V DC > #2 22.01X21+17.78X22+4.55X23+7.99X24 + 36.7X25+36.35X26

 $WH\ V\ DC > \#4\ 38.69X41\ 7.58X42\ 19.11X43\ 30.97X44\ 59.68X45\ 59.33X46\ <=527X44\ 59.68X45\ 59.68X45\$

Linking Constraints X11+ X12+X13+X14+X15+X16-4101Y1<=0 X21+X22+X23+X24+X25+X26-4101Y2<=0 X31+X32+X33+X34+X35+X36-4101Y3<=0 X41+X42+X43+X44+X45+X46-4101Y4<=0

Model Optimized for Min Costs to Supply DCs

Implement your formulation into Excel and be sure to make it neat. This section should include:

- A screenshot of your optimized final model (formatted nicely, of course)

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	3 Praline Park 4 Twizzler Tunnels 5 Toblerone Tower	527 601	38.45 44.76	9 -93.3	16							Jolly Rancher Range Honeycomb Highlands	201					
	Sugarplum Springs	573	42.47					43.71×11 + 12.6×12 + 17	15X13 + 22.35X14 + 51.06X15 + 50	71X16 + 22.01X21 + 17.	78X22 + 4.55X23	1 + 7.99X24 + 36.7X25 + 36.3	5X26 + 10.77X31 + 24	1X32 + 15.79	X33 + 13.5	7X34 + 30.38)	35 + 30.03>	36 + 38.
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-	1 3	30.18	-70.7			-86.32		11 19.11X43										
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To minimize cost, these are the decision variables needed.

Model with Stipulation

Please copy the tab of your original model before continuing with the next part to avoid messing up your original solution.

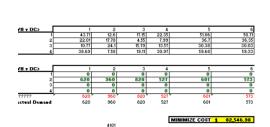
Please perform 2 out of the 3 scenarios below with a short text description on what changed:

1. Instead of only being able to open 2 warehouses, what happens to our objective function when we only can open 1 warehouse?

When we reduce warehouses, our objective function is minimizing cost increases

- 2. Right now, we have \$1 per unit shipped over the distance between the warehouse and the DC. What happens to our objective function when we increase this to \$30? Does your DC assignment change at all?

 No because during the model formulation, cost per unit was nowhere utilized when
 - No because during the model formulation, cost per unit was nowhere utilized when inputting it into solver.
- 3. For distance between each location, we used Manhattan distance but what happens to our model if we use Euclidean distance instead? Did the change impact the model at all? Do you feel this is a better distance metric to use in this scenario?



22.01511 17.78027 4.50327 7.50324 - 32.7325 - 32.0326 13.77321 - 24.027 15.77321 - 24.027 15.7732 - 23.0236 - 32.023

WH Sum sent	Binary	Linking Constraints	Possible Costs	Actu
0	0	0	2469	
4101	1	0	1005	
	0	0	1005	
	0	0	2062	

4.

