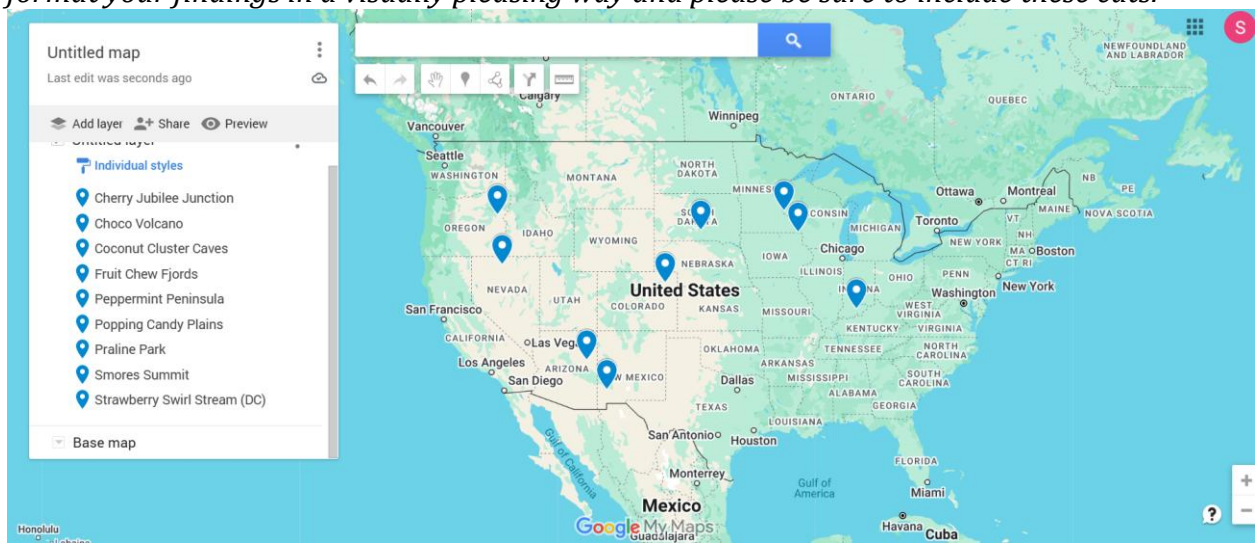
Module 12 – Location Graph

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:



Model Formulation

Try to 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. Hint: Linking constraints aren't needed since we are using Nonlinear GRG but refer to the associated PowerPoint in your data if you need help.

Decision Variables:

X1 = Location of the new Distribution Center with respect to the X axis
Y1 = Location of the new Distribution Center with respect to the Y axis

Objective Function:

MIN SQRT (((43.56-Xi)^2)+(-91.61-Yi)^2)) + SQRT (((34.95-Xi)^2)+(-110.05-Yi)^2)) + SQRT (((41.52-Xi)^2)+(-117.4-Yi)^2)) + SQRT (((43.71-Xi)^2)+(-100.08-Yi)^2)) + SQRT (((40.28-Xi)^2)+(-103.16-Yi)^2)) + SQRT (((32.86-Xi)^2)+(-108.24-Yi)^2)) + SQRT (((38.57-Xi)^2)+(-86.51-Yi)^2)) + SQRT (((44.93-Xi)^2)+(-92.8-Yi)^2))

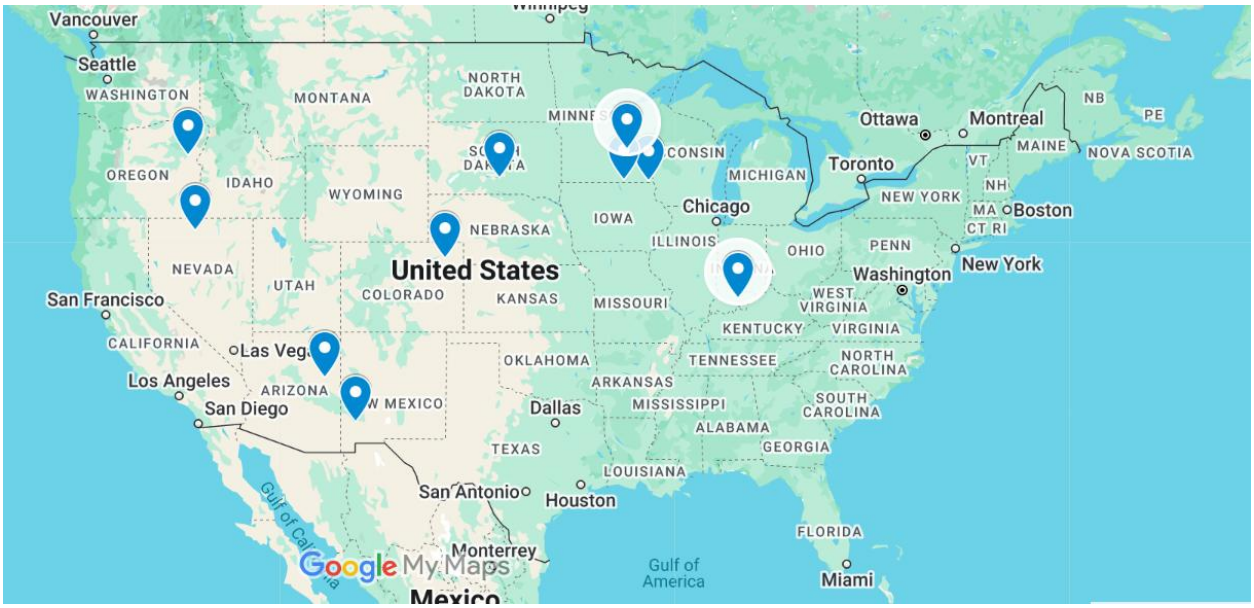
No Constraints

Model Optimized for Distance Reduction from DC to Store

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

	Store Location		Current DC			New DC				
Stores	Lat	Long	Lat	Long	Current DC Dist	Lat	Long	New DC Dist	Use New?	Dist
Cherry Jubilee Junction	43.56	-91.61	44.67	-117.89	26.30343134	43.65016	-93.0116	1.4045068	TRUE	1.404507
Choco Volcano	34.95	-110.05	44.67	-117.89	12.487754	43.65016	-93.0116	19.1311148	FALSE	12.48775
Coconut Cluster Caves	41.52	-117.4	44.67	-117.89	3.18788331	43.65016	-93.0116	24.481241	FALSE	3.187883
Fruit Chew Fjords	43.71	-100.08	44.67	-117.89	17.83585434	43.65016	-93.0116	7.06864342	TRUE	7.068643
Peppermint Peninsula	40.28	-103.16	44.67	-117.89	15.3702635	43.65016	-93.0116	10.6933537	TRUE	10.69335
Popping Candy Plains	32.86	-108.24	44.67	-117.89	15.25118356	43.65016	-93.0116	18.66364	FALSE	15.25118
Praline Park	38.57	-86.51	44.67	-117.89	31.96739589	43.65016	-93.0116	8.25099841	TRUE	8.250998
Smores Summit	44.93	-92.8	44.67	-117.89	25.09134711	43.65016	-93.0116	1.29721413	TRUE	1.297214
						Lat	Long			
Objective---------->	59.64154				New DC:	43.65016	-93.0116			

This model recommends the exact location for a new Distribution Center for the Fish and Murr Candy Shop based on the locations of our current stores with intention to place a new distribution center closer to our stores.



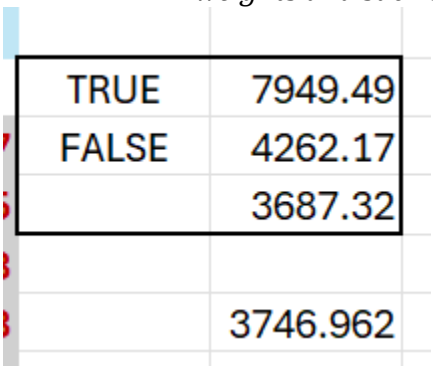
Model with Stipulation

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

You should notice that while distance is minimized between each store and each DC, there is a discrepancy between how much demand is serviced between each DC (i.e. one DC may service a lot more demand than others). Please:

1. *Choose one:*
    a. *Implement a change that picks a location for the new DC to distance **AND** load. You can do this by multiplying distance by demand if a store is serviced by a particular DC.*
    b. *Instead of just summing the distance, also add the difference between demand serviced between each DC (i.e. if the old DC serves stores with 8000 total demand and the new DC does 3000 then the difference would be 5000). Be sure*

to not remove the sum of distance too, it should be both. You may want to add weights and such but not necessary



TRUE	7949.49
FALSE	4262.17
	3687.32
	3746.962

2. *Provide a text explanation on what your model is recommending now with this change.*

The Model is recommending a better optimization for the distance and demand for the new DC. The new DC will slightly favor cities with more demand making it more optimal. The objective solution is more optimal.

3. *Explain the changes to your Solver/Model.*

None