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)*
  + <https://mymaps.google.com/>
  + Find a map with latitude/longitude and place them approximately
  + Any alternative that gives the same effect

A map of the united states

AI-generated content may be incorrect.

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: 2708X\_1 +2774X\_4 + 17.21\*919 +15.9\*922 +4.08\*730+11.6\*657 +12.14\*720+26.41\*931

All units have to be greater than 0 and an integer.

Sum=Demand

Linking constraints are less than or equal to 0

Binary variables are a binary number

2 or less warehouses used

A screenshot of a computer

AI-generated content may be incorrect.

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)*
* *A text explanation of what your model is recommending*

A screenshot of a spreadsheet

AI-generated content may be incorrect.

My model is recommending that warehouses 1 and 4 be used to incur the least cost of $79,892. To incur the least cost there must be 3,228 units allocated to warehouse 1 split between DC 2 with 919 units, DC 4 with 922 units, DC 5 with 730 units, and DC 6 with 657 units. There are also 1,651 units allocated to warehouse 4, allocated between DC 1 with 720 units and DC 3 with 931 units.

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?*

The total cost increases to $121,319 and all 4,879 units are from warehouse 1split between DC 1 with 720 units, DC 2 with 919 units, DC 3 with 931 units, DC 4 with 922 units, DC 5 with 730 units, and DC 6 with 657 units.

1. *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?*

Dc assignment stays the same the only thing that changes is the objective function as cost increases to $2,237,796.

1. *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?*

