Module 02 – Transportation Modeling

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:

- *The locations involved in the analysis (id -> name) and specify if they are a source or a destination*
- *A table of the average cost between source and destination (for the sake of this assignment, we are dealing with sugar-miles similar to the bushel-mile example from the textbook)*

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 = $.18X_{15}+ .18X_{16}+ .05X_{17}+ .09X_{18}+ .19X_{19}+ .09X_{110}+ .16X_{25}+ .136X_{26}+ .122X_{27}+ .137X_{28}+ .132X_{29}+.129X_{210}+.05X_{35}+.94X_{36}+.065X_{37}+.079X_{38}+.085X_{39}+.073X_{310}+.07X_{45}+.07X_{46}+.05X_{47}+ .07X_{48}+ .12X_{49}+.19X_{410}$

Subject to

$X_{15}, X_{16}, X_{17}, X_{18}, X_{19}, X_{110}, X_{25}, X_{26}, X_{27}, X_{28}, X_{29}, X_{210}, X_{35}, X_{36}, X_{37}, X_{38}, X_{39}, X_{310}, X_{45}, X_{46}, X_{47}, X_{48}, X_{49}, X_{410} \geq 0$

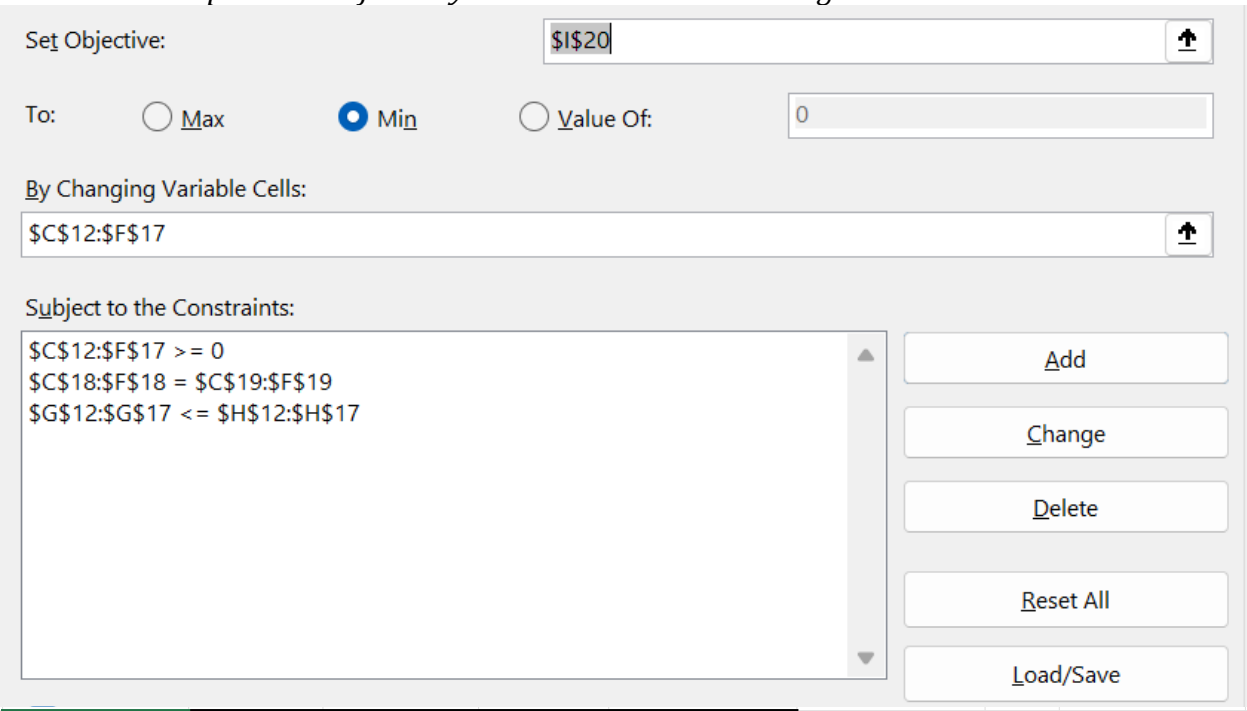
$X_{15} + X_{16} + X_{17} +X_{18} + X_{19} + X_{110} = 186$
$X_{25} + X_{26} + X_{27} +X_{28} + X_{29} + X_{210} = 163$
$X_{35} + X_{36} + X_{37} +X_{38} + X_{39} + X_{310} = 146$
$X_{45} + X_{46} + X_{47} +X_{48} + X_{49} + X_{410} = 101$

$X_{15} + X_{25} + X_{35} +X_{45} \leq 100$
$X_{16} + X_{26} + X_{36} +X_{46} \leq 100$
$X_{17} + X_{27} + X_{37} +X_{47} \leq 100$
$X_{18} + X_{28} + X_{38} +X_{48} \leq 100$
$X_{19} + X_{29} + X_{39} +X_{49} \leq 100$
$X_{110} + X_{210} + X_{310} +X_{410} \leq 100$

Model Optimized for Cost

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*



	Bonbon Borough	Frosted Fluff Fields	Hazelnut Haven	Coconut Cluster Caves
Toblerone Tower	0.180	0.160	0.050	0.070
Pixie Stix Plateau	0.180	0.136	0.094	0.070
Licorice Labyrinth	0.050	0.122	0.065	0.050
Snickerdoodle Slopes	0.090	0.137	0.079	0.070
Macaron Market	0.190	0.132	0.085	0.120
Tangerine Taffy Tropics	0.090	0.129	0.072	0.190

	Bonbon Borough	Frosted Fluff Fields	Hazelnut Haven	Coconut Cluster Caves		Demand
Toblerone Tower	0	0	100	0	100	100
Pixie Stix Plateau	0	0	0	101	101	116
Licorice Labyrinth	114	0	0	0	114	114
Snickerdoodle Slopes	72	0	2	0	74	110
Macaron Market	0	101	0	0	101	101
Tangerine Taffy Tropics	0	62	44	0	106	106
	186	163	146	101		
Capacity	186	163	146	101		
						48.89465081

The model is recommending how many units to produce at each location, and which shop to send them to while trying to minimize cost and meet all constraints.

Model with Stipulation

*Please copy the tab of your original model before continuing with the next part to avoid messing up your original solution. What happens if you add an additional constraint to the model such that all demand **MUST** be met. Is the solution still feasible? If not, please explain why.*

There is not a Feasible solution if this constraint is added, because total demand is greater than total capacity.