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)*

Average of unit	Column Labels						
Row Labels	Malted Milk Manor	Marshmallow Meadows	Meringue Mountains	Peppermint Parlor	Pixie Stix Plateau	Turkish Delight Tundra	Grand Total
Buttercream Beach	0.17	0.19	0.17	0.18	0.06	0.05	0.13
Chocolate River Rapids	0.13	0.18	0.06	0.15	0.17	0.14	0.14
Coconut Cluster Caves	0.08	0.10	0.09	0.10	0.14	0.12	0.10
Jellybean Jungle	0.08	0.16	0.07	0.19	0.14	0.09	0.12
Grand Total	**0.12**	**0.16**	**0.10**	**0.16**	**0.12**	**0.10**	**0.13**

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 = 0.17X15 + 0.19X16 + 0.07X17 + 0.18X18 + 0.06X19 + 0.05X110 + 0.13X25 + 0.18X26 + 0.06X27 + 0.15X28 + 0.17X29 + 0.14X210 + 0.08X35 + 0.1X36 +0.09X37 + 0.1X38 + 0.14X39 + 0.12X310 + 0.08X45 +0.16X46 + 0.07X47 + 0.19X48 + 0.014X49 + 0.19X410

Objective: X15 + X16 + X17 + X18 + X19 + X110 + X25 + X26 + X27 + X28 + X29 + X210 + X35 + X36 + X37 + X38 + X39 + X310 + X45 + X46 + X47 + X48 + X49 + X410 ≥ 0

Constraints:

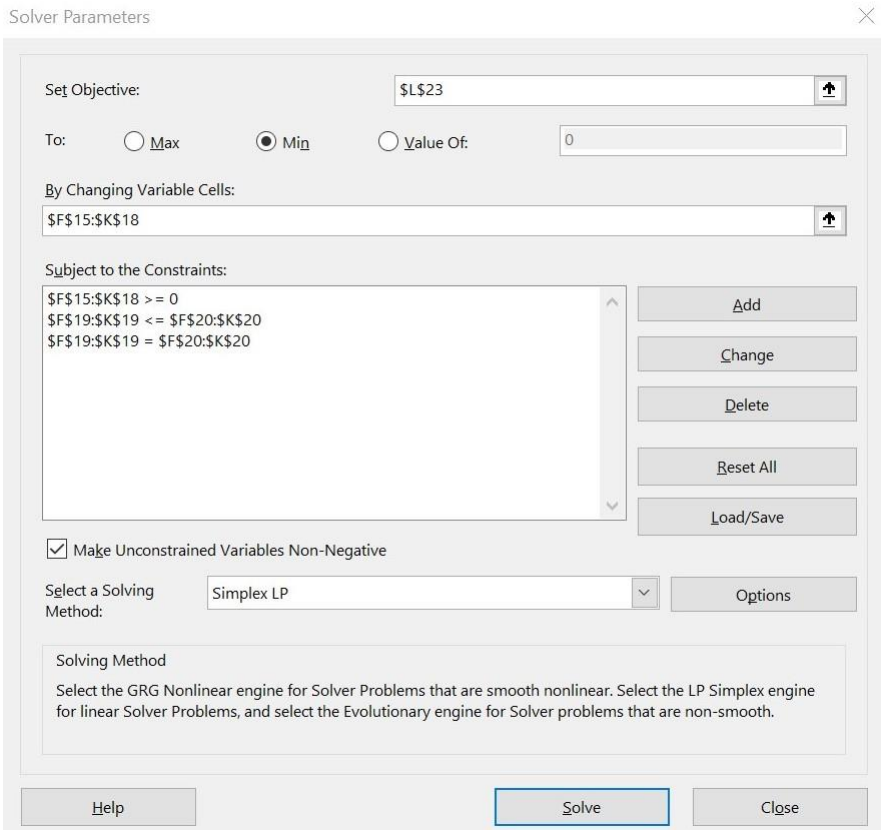
X15 + X16 + X17 + X18 + X19 + X110 = 125
X25 + X26 + X27 + X28 + X29 + X210 = 143
X35 + X36 + X37 + X38 + X39 + X310 = 115
X45 + X46 + X47 + X48 + X49 + X410 = 105

X15 + X25 + X35 + X45 ≤ 82
X16 + X26 + X36 + X46 ≤ 88
X17 + X27 + X37 + X47 ≤ 86
X18 + X28 + X38 + X48 ≤ 82
X19 + X29 + X39 + X49 ≤ 83
X110 + X210 + X310 + X410 ≤ 90

Model Optimized for Profit

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*



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Grand Total	**0.12**	**0.16**	**0.10**	**0.16**	**0.12**	**0.10**	**0.13**

location_id	capacity
Sa976849	125
S98afbde	143
S6f5cad9	115
S43d4c90	105

destination	demand
De569c11	82
Db55b4cc	88
Da9dbda0	86
D662583f	82
D4d5a593	83
D3c0b041	90

	Malted Milk Manor	Marshmallow Meadows	Meringue Mountains	Peppermint Parlor	Pixie Stix Plateau	Turkish Delight Tundra	SUM	capacity
Buttercream Beach	0.00	0.00	0.00	0.00	83.00	90.00	173.00	125
Jellybean Jungle	0.00	0.00	86.00	0.00	0.00	0.00	86.00	143
Chocolate River Rapids	82.00	88.00	0.00	82.00	0.00	0.00	252.00	115
Coconut Cluster Caves	0.00	0.00	0.00	0.00	0.00	0.00	0.00	105
SUM	82.00	88.00	86.00	82.00	83.00	90.00		
MAX	82	88	86	82	83	90		

total cost	**38.20**

The model is essentially showing how much will be produced at a certain location and where this product will be going. So, for example, Malted Milk Manor is the producer for Chocolate River Rapids and Meringue Mountains is the only producer for Jellybean Jungle.

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.*

It is not feasible in this case because the total production at Buttercream Beach exceeds the available demand, resulting in an imbalance.