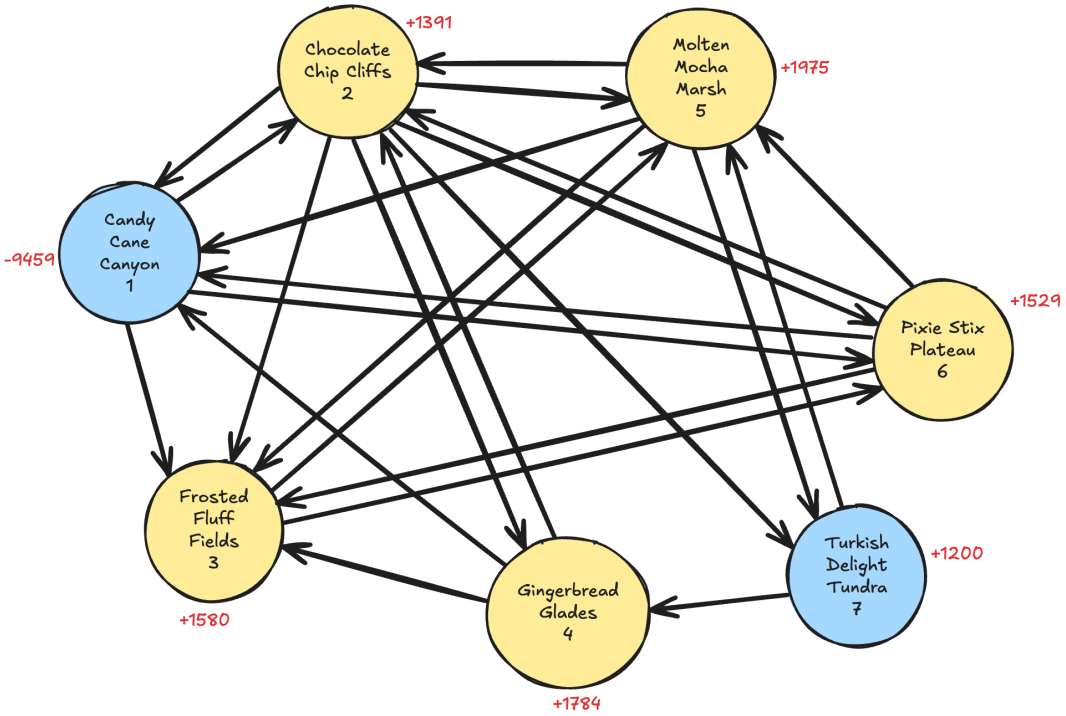
Module 10 – MOLP

Exploratory Data Analysis

-Choose a visualization method (expect 7 nodes and ~24 arcs):



(The red numbers are the supply/demand.)
(The node/s that have a negative value represents supply and the positive values are the demand.)

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. For this problem, I am only asking that you perform the model formulation for the MOLP model.

Model Optimized for Equally Weighted Objectives

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

Ship	From	To	Unit Cost	Latitude (X1)	Longitude (X2)	Latitude (Y1)	Longitude (Y2)	Distance	Method	Binary	Congestion	Binary
6350	1 Candy Cane	2 Chocolate C	$ 19	37.5	-102.5	35.23	-108.66	200.76	Diesel Trucks	1	24	0
1580	1 Candy Cane	3 Frosted Fluff	$ 23	37.5	-102.5	44.1	-115.29	212.14	Air Freight	1	26	0
1529	1 Candy Cane	6 Pixie Stix Pla	$ 6	37.5	-102.5	30.18	-112.83	200.13	Cargo Ships (Heavy Fuel Oil)	1	85	1
0	2 Chocolate C	1 Candy Cane	$ 8	35.23	-108.66	37.5	-102.5	200.76	Electric/Hybrid Trucks	0	102	1
0	2 Chocolate C	3 Frosted Fluff	$ 9	35.23	-108.66	44.1	-115.29	214.73	Air Freight	1	91	1
1784	2 Chocolate C	4 Gingerbread	$ 17	35.23	-108.66	36.54	-90.7	192.08	Cargo Ships (Heavy Fuel Oil)	1	98	1
1975	2 Chocolate C	5 Molten Moch	$ 9	35.23	-108.66	36.13	-111.4	206.08	Diesel Rail	1	104	1
0	2 Chocolate C	6 Pixie Stix Pla	$ 18	35.23	-108.66	30.18	-112.83	202.87	Diesel Rail	1	82	1
1200	2 Chocolate C	7 Turkish Delig	$ 24	35.23	-108.66	41.57	-92.9	196.94	Cargo Ships (Heavy Fuel Oil)	1	109	1
0	3 Frosted Fluff	5 Molten Moch	$ 24	44.1	-115.29	36.13	-111.4	217.19	Diesel Trucks	1	96	1
0	3 Frosted Fluff	6 Pixie Stix Pla	$ 14	44.1	-115.29	30.18	-112.83	214.14	Electric/Hybrid Trucks	0	30	0
0	4 Gingerbread	1 Candy Cane	$ 14	36.54	-90.7	37.5	-102.5	189.18	Slow Steaming Cargo Ships	0	30	0
0	4 Gingerbread	2 Chocolate C	$ 22	36.54	-90.7	35.23	-108.66	192.08	Cargo Ships (Heavy Fuel Oil)	1	84	1
0	4 Gingerbread	3 Frosted Fluff	$ 22	36.54	-90.7	44.1	-115.29	203.95	Air Freight	1	101	1
0	5 Molten Moch	1 Candy Cane	$ 18	36.13	-111.4	37.5	-102.5	203.38	Air Freight	1	82	1
0	5 Molten Moch	2 Chocolate C	$ 16	36.13	-111.4	35.23	-108.66	206.08	Air Freight	1	85	1
0	5 Molten Moch	3 Frosted Fluff	$ 7	36.13	-111.4	44.1	-115.29	217.19	Electric/Hybrid Trucks	0	87	1
0	5 Molten Moch	7 Turkish Delig	$ 17	36.13	-111.4	41.57	-92.9	199.62	Cargo Ships (Heavy Fuel Oil)	1	35	0
0	6 Pixie Stix Pla	1 Candy Cane	$ 16	30.18	-112.83	37.5	-102.5	200.13	Electric/Hybrid Trucks	0	93	1
0	6 Pixie Stix Pla	2 Chocolate C	$ 21	30.18	-112.83	35.23	-108.66	202.87	Diesel Rail	1	28	0
0	6 Pixie Stix Pla	3 Frosted Fluff	$ 9	30.18	-112.83	44.1	-115.29	214.14	Air Freight	1	94	1
0	6 Pixie Stix Pla	5 Molten Moch	$ 16	30.18	-112.83	36.13	-111.4	205.47	Cargo Ships (Heavy Fuel Oil)	1	98	1
0	7 Turkish Delig	4 Gingerbread	$ 12	41.57	-92.9	36.54	-90.7	185.13	Cargo Ships (Heavy Fuel Oil)	1	31	0
0	7 Turkish Delig	5 Molten Moch	$ 19	41.57	-92.9	36.13	-111.4	199.62	Wind-powered Ships	0	93	1

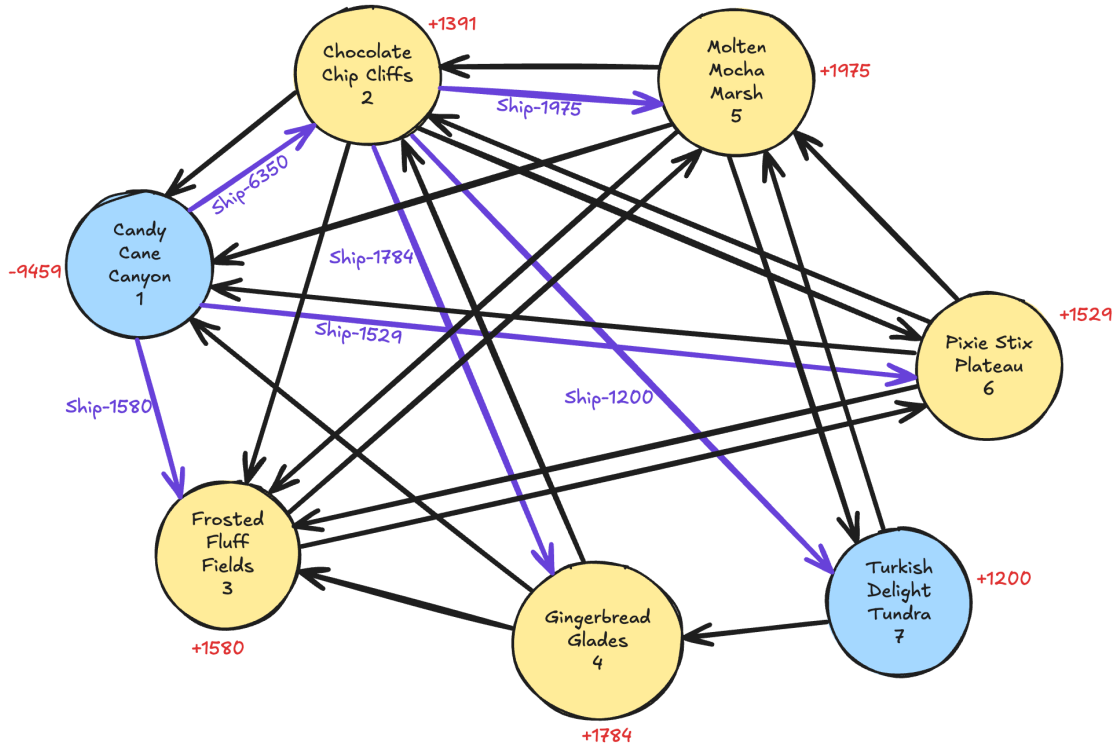
OBJECTIVE	Totals	Tartget	Deviation	% Deviation	W	Weigthed % Deviation
Total Transportation Cost	$ 243,067.00	$ 213,777.00	$ 29,290.00	13.70%	1	13.70%
Total Distance Traveled	$ 2,902,018.87	$ 2,899,563.46	$ 2,455.42	0.08%	1	0.08%
Eco-Friendliness	14418	14418	0	0.00%	1	0.00%
Congension Levels	6488	6488	0	0.00%	1	0.00%

Minimax	0.17

-A text explanation of what your model is recommending

- *My model is recommending the best-balanced solution across all objectives under the current weights and allowing a moderate deviation to ensure the optimal performance.*

-Update your graph from the EDA section to indicate which arcs are used



Model with Stipulation

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

Alter the weights of each objective to add weight to match what matters most to you. Perhaps run a few different scenarios to see how the routes change depending on the weights. When you find a weight mix and solution that satisfies you, please write a justification on why you chose the final model/weights and about how a configured model like yours can be used for scenario planning.