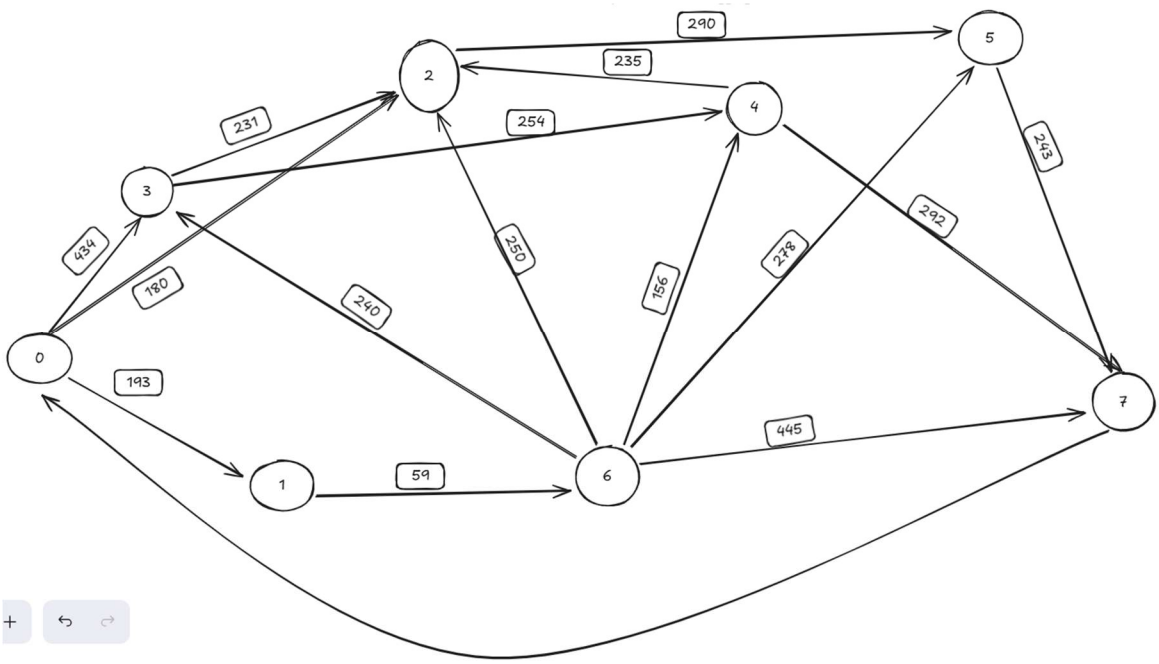
Module 07 – Maximal Flow

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 like what we saw for the sample problem*
  - https://excalidraw.com
  - https://mermaid.live
  - https://dreampuf.github.io/GraphvizOnline
  - Powerpoint/Word



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.

Max:
X_{70}

Constraints:
Node 0: $+X_{70} - X_{01} - X_{02} - X_{03} = 0$

Node 1: $+X_{01} - X_{16} = 0$

Node 2: $+X_{02} + X_{32} + X_{42} + X_{62} - X_{25} = 0$

Node 3: $+X_{03}+X_{63}-X_{32}-X_{34}=0$

Node 4: $+X_{34}+X_{64}-X_{42}-X_{47}=0$

Node 5: $+X_{25}+X_{65}-X_{57}=0$

Node 6: $+X_{16}-X_{62}-X_{63}-X_{64}-X_{65}-X_{67}=0$

Node 7: $+X_{47}+X_{57}+X_{67}-X_{70}=0$

Model Optimized for Maximal Flow

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

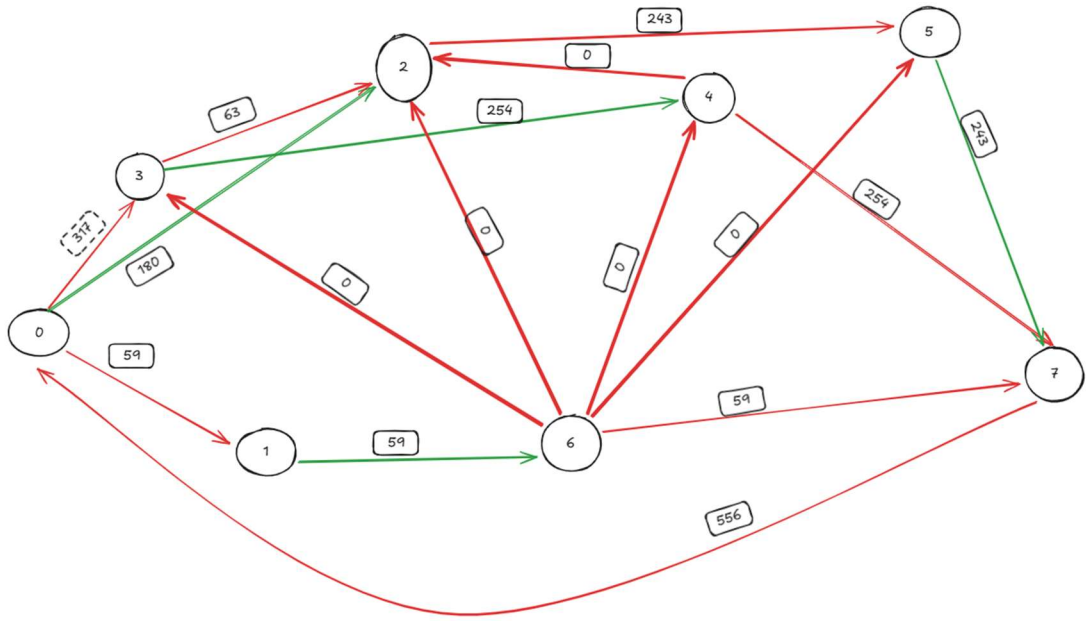
- *A screenshot of your optimized final model (formatted nicely, of course)*

Maximal Flow -> 556

Units of Flow	Links From		To	Upper Bound
59	0	Churro Chamber	**1** Coconut Cluster Caves	**193**
180	0	Churro Chamber	**2** Fudge Falls	**180**
317	0	Churro Chamber	**3** Jolly Rancher Range	**434**
59	1	Coconut Cluster Caves	**6** Strawberry Swirl Stream	**59**
243	2	Fudge Falls	**5** Snickerdoodle Slopes	**290**
63	3	Jolly Rancher Range	**2** Fudge Falls	**231**
254	3	Jolly Rancher Range	**4** Pudding Peaks	**254**
254	4	Pudding Peaks	**7** Taffy Tundra	**292**
0	4	Pudding Peaks	**2** Fudge Falls	**235**
243	5	Snickerdoodle Slopes	**7** Taffy Tundra	**243**
59	6	Strawberry Swirl Strear	**7** Taffy Tundra	**445**
0	6	Strawberry Swirl Strear	**2** Fudge Falls	**250**
0	6	Strawberry Swirl Strear	**3** Jolly Rancher Range	**240**
0	6	Strawberry Swirl Strear	**4** Pudding Peaks	**156**
0	6	Strawberry Swirl Strear	**5** Snickerdoodle Slopes	**278**
556	7	Taffy Tundra	**0** Churro Chamber	**9999**

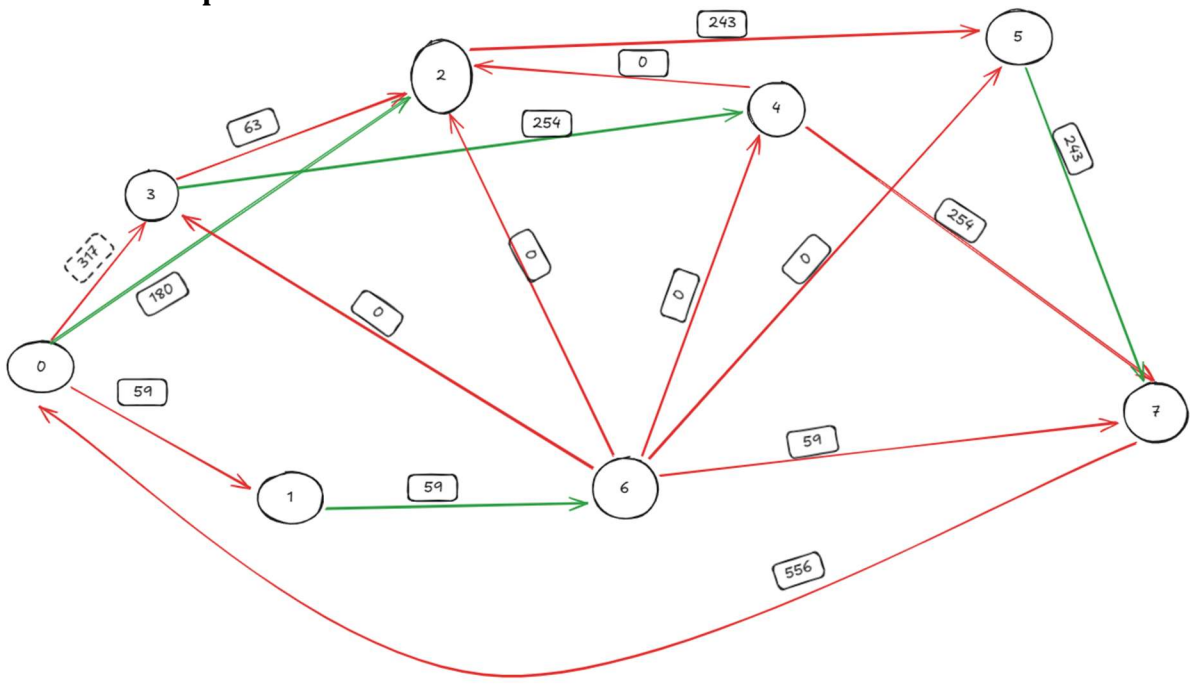
	Nodes	Inflow	Outflow	Net Flow	Supply / Demand
0	Churro Chamber	556	556	0	**0**
1	Coconut Cluster Caves	59	59	0	**0**
2	Fudge Falls	243	243	0	**0**
3	Jolly Rancher Range	317	317	0	**0**
4	Pudding Peaks	254	254	0	**0**
5	Snickerdoodle Slopes	243	243	0	**0**
6	Strawberry Swirl Stream	59	59	0	**0**
7	Taffy Tundra	556	556	0	**0**

- *A text explanation of what your model is recommending, especially any identified bottlenecks*
- *Update your graph from the EDA section to bold/color the links being used (and show how much is going through that link)*



-

Model with Stipulation



If we used the more favorable paths that are in green, it could lower costs and improve flow. If we removed the ones with 0, it could also improve flow.