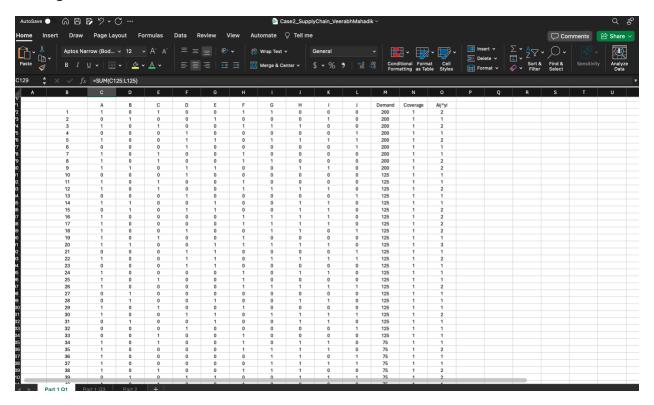
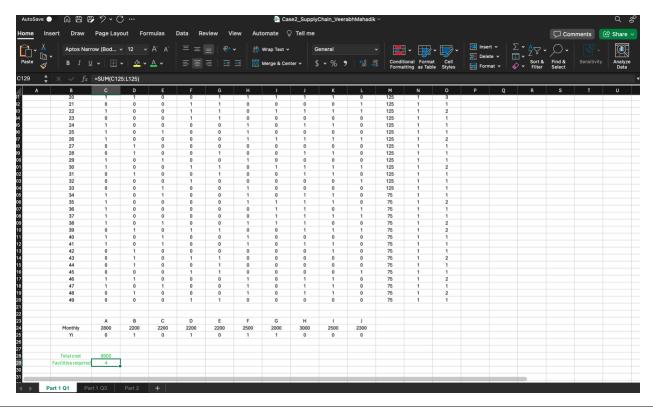
Part I: YumPizza initially started to serve all customers without a budget constraint.

• Solve for the optimal pizzeria locations using Excel. How many facilities do you need to cover

all neighborhoods? What is the total cost?





	Α	В	С	D	Е	F	G	Н	I	J	Demand	Coverage	Aij*yi
1	1	0	1	0	0	1	1	0	0	0	200	1	2
2	0	1	0	0	1	0	0	0	1	0	200	1	1
3	1	0	1	0	0	1	1	1	0	0	200	1	2
4	0	0	0	1	0	0	0	0	0	1	200	1	1
5	1	0	0	1	1	0	1	1	1	1	200	1	2
6	0	0	0	1	0	0	0	0	0	1	200	1	1
7	1	0	1	0	0	1	0	0	0	0	200	1	1
8	1	0	1	0	0	1	1	0	0	0	200	1	2
9	1	1	0	1	1	0	0	1	1	0	200	1	2
10	0	0	0	1	0	0	0	0	0	0	125	1	1
11	1	0	1	0	0	1	0	0	0	0	125	1	1
12	1	0	1	0	0	1	1	1	1	0	125	1	2
13	0	0	0	1	0	0	0	0	0	1	125	1	1
14	1	1	0	0	1	0	0	1	1	0	125	1	1
15	0	1	0	1	1	0	0	1	1	0	125	1	2
16	1	0	0	0	0	1	1	1	1	0	125	1	2
17	1	0	0	0	0	1	1	1	1	0	125	1	2
18	1	0	0	1	0	0	1	1	0	1	125	1	2
19	1	0	1	0	0	1	0	0	0	0	125	1	1
20	1	1	0	0	1	1	1	1	1	0	125	1	3

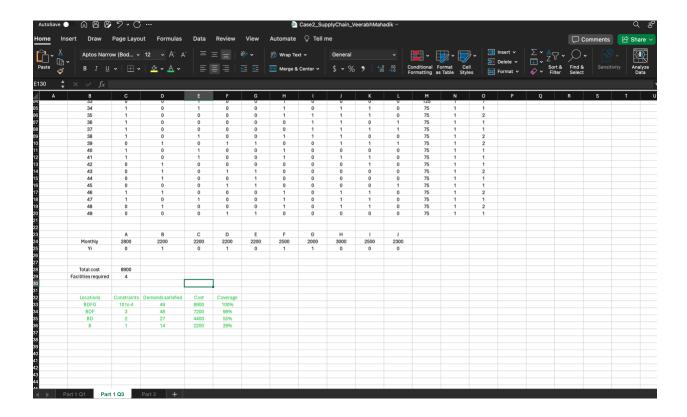
21	0	0	0	1	1	0	0	0	0	1	125	1	1
22	1	0	0	1	1	0	1	1	1	1	125	1	2
23	0	0	0	1	1	0	0	0	0	0	125	1	1
24	1	0	0	0	0	1	0	1	1	0	125	1	1
25	1	0	1	0	0	1	0	0	0	0	125	1	1
26	1	0	0	0	0	1	1	1	1	1	125	1	2
27	0	1	0	0	0	0	0	0	0	0	125	1	1
28	0	1	0	0	1	0	0	1	1	0	125	1	1
29	1	0	1	0	0	1	0	0	0	0	125	1	1
30	1	0	0	1	1	0	1	1	1	1	125	1	2
31	0	1	0	0	1	0	0	1	1	0	125	1	1
32	0	0	0	1	0	0	0	0	0	1	125	1	1
33	0	0	1	0	0	1	0	0	0	0	125	1	1
34	1	0	1	0	0	1	0	1	1	0	75	1	1
35	1	0	0	0	0	1	1	1	1	0	75	1	2
36	1	0	0	0	0	0	1	1	0	1	75	1	1
37	1	0	0	0	0	0	1	1	1	1	75	1	1
38	1	0	1	0	0	1	1	1	0	0	75	1	2
39	0	1	0	1	1	0	0	1	1	1	75	1	2
40	1	0	1	0	0	1	0	0	0	0	75	1	1
41	1	0	1	0	0	1	0	1	1	0	75	1	1
42	0	1	0	0	0	0	0	0	1	0	75	1	1
43	0	1	0	1	1	0	0	0	0	0	75	1	2
44	0	1	0	0	1	0	0	0	0	0	75	1	1
45	0	0	0	1	1	0	0	0	0	1	75	1	1
46	1	1	0	0	0	1	0	1	1	0	75	1	2
47	1	0	1	0	0	1	0	1	1	0	75	1	1
48	0	1	0	0	0	1	0	1	1	0	75	1	2
49	0	0	0	1	1	0	0	0	0	0	75	1	1
	Α	В	С	D	Е	F	G	Н	I	J			
Monthly	2800	2200	2200	2200	2200	2500	2000	3000	2500	2300			
Yi	0	1	0	1	0	1	1	0	0	0			
Total cost	8900												
Facilities	4												
required		<u> </u>										<u> </u>	

• What are your overall observations in your approach?

The given information includes a Distance matrix detailing the time required for delivery from facilities to demand locations, along with Monthly leasing costs associated with the latitude and longitude of these locations. The initial constraint applied is a 15-minute delivery time, utilizing an "IF" formula with 1 for True and 0 for False under Condition 1. This process results in the creation of a potential delivery Distance Matrix. It is determined that facilities B, D, F, and G are viable options for demand coverage, incurring a total cost of \$8900.

• Perform sensitivity analysis such as the marginal coverage of the very last facility location,

the second to the last facility and so on.



Locations	Constraints	Demands satisfied	Cost	Coverage
BDFG	10 to 4	49	8900	1
BDF	3	48	7200	0.98
BD	2	27	4400	0.55
В	1	14	2200	0.29

Part II: YumPizza agrees that serving all customers may not be a realistic goal. Additionally, YumPizza can spend only \$6,000 per month for rent.

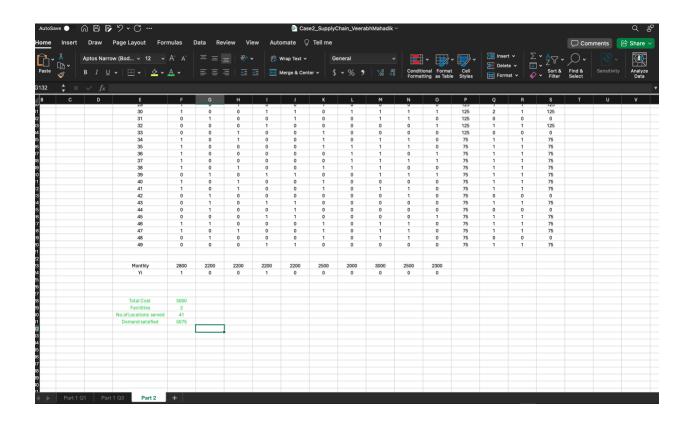
• How would you suggest that YumPizza change their supply chain strategy? Specifically, what

should they choose as an objective function and why?

YumPizza's monthly rent budget is at \$6,000, prompting the consideration of the maximal covering location problem (MCLP) model. This model focuses on maximizing customer coverage while adhering to budget constraints. With the budget limitation in mind, our objective is to maximize the demand met. Additionally, to stay within the \$6,000 budget, we must incorporate the monthly leasing cost as a constraint to prevent exceeding the limit.

• Solve for the optimal pizzeria locations using Excel under the strategy and objective function

proposed above. How much neighborhoods does YumPizza now serve? What is the total cost? What are your overall observations?



	Α	В	С	D	E	F	G	Н	1	J	Demand(Di)	Aij*yi	Zi	Di*Zi
1	1	0	1	0	0	1	1	0	0	0	200	1	1	200
2	0	1	0	0	1	0	0	0	1	0	200	0	0	0
3	1	0	1	0	0	1	1	1	0	0	200	1	1	200
4	0	0	0	1	0	0	0	0	0	1	200	1	1	200
5	1	0	0	1	1	0	1	1	1	1	200	2	1	200
6	0	0	0	1	0	0	0	0	0	1	200	1	1	200
7	1	0	1	0	0	1	0	0	0	0	200	1	1	200
8	1	0	1	0	0	1	1	0	0	0	200	1	1	200
9	1	1	0	1	1	0	0	1	1	0	200	2	1	200
10	0	0	0	1	0	0	0	0	0	0	125	1	1	125
11	1	0	1	0	0	1	0	0	0	0	125	1	1	125
12	1	0	1	0	0	1	1	1	1	0	125	1	1	125
13	0	0	0	1	0	0	0	0	0	1	125	1	1	125
14	1	1	0	0	1	0	0	1	1	0	125	1	1	125
15	0	1	0	1	1	0	0	1	1	0	125	1	1	125
16	1	0	0	0	0	1	1	1	1	0	125	1	1	125
17	1	0	0	0	0	1	1	1	1	0	125	1	1	125

18	1	0	0	1	0	0	1	1	0	1	125	2	1	125
19	1	0	1	0	0	1	0	0	0	0	125	1	1	125
20	1	1	0	0	1	1	1	1	1	0	125	1	1	125
21	0	0	0	1	1	0	0	0	0	1	125	1	1	125
22	1	0	0	1	1	0	1	1	1	1	125	2	1	125
23	0	0	0	1	1	0	0	0	0	0	125	1	1	125
24	1	0	0	0	0	1	0	1	1	0	125	1	1	125
25	1	0	1	0	0	1	0	0	0	0	125	1	1	125
26	1	0	0	0	0	1	1	1	1	1	125	1	1	125
27	0	1	0	0	0	0	0	0	0	0	125	0	0	0
28	0	1	0	0	1	0	0	1	1	0	125	0	0	0
29	1	0	1	0	0	1	0	0	0	0	125	1	1	125
30	1	0	0	1	1	0	1	1	1	1	125	2	1	125
31	0	1	0	0	1	0	0	1	1	0	125	0	0	0
32	0	0	0	1	0	0	0	0	0	1	125	1	1	125
33	0	0	1	0	0	1	0	0	0	0	125	0	0	0
34	1	0	1	0	0	1	0	1	1	0	75	1	1	75
35	1	0	0	0	0	1	1	1	1	0	75	1	1	75
36	1	0	0	0	0	0	1	1	0	1	75	1	1	75
37	1	0	0	0	0	0	1	1	1	1	75	1	1	75
38	1	0	1	0	0	1	1	1	0	0	75	1	1	75
39	0	1	0	1	1	0	0	1	1	1	75	1	1	75
40	1	0	1	0	0	1	0	0	0	0	75	1	1	75
41	1	0	1	0	0	1	0	1	1	0	75	1	1	75
42	0	1	0	0	0	0	0	0	1	0	75	0	0	0
43	0	1	0	1	1	0	0	0	0	0	75	1	1	75
44	0	1	0	0	1	0	0	0	0	0	75	0	0	0
45	0	0	0	1	1	0	0	0	0	1	75	1	1	75
46	1	1	0	0	0	1	0	1	1	0	75	1	1	75
47	1	0	1	0	0	1	0	1	1	0	75	1	1	75
48	0	1	0	0	0	1	0	1	1	0	75	0	0	0
49	0	0	0	1	1	0	0	0	0	0	75	1	1	75
Monthly	2800	2200	2200	2200	2200	2500	2000	3000	2500	2300				
Yi	1	0	0	1	0	0	0	0	0	0				

Total Cost	5000							
Facilities	2							
No.of Locations served	41							
Demand satsified	5075							

• Compare with previous solution in Part I where all neighborhoods are covered. Comments.

On comparing Part II with Part I, despite utilizing the same data for resolution, there are discrepancies in the objective functions, constraints, and limitations between the two cases. The overall cost has decreased from \$8900 to \$5000, and the number of facilities available for delivery has also reduced from 4 to 2. This underlines the importance of prioritizing coverage and considering budget constraints when making supply chain decisions.