BUSM 3021
Business Analytics
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Homework 5

Due 11/18/2021

PROBLEM 1: Moving Company Shipment Problem

Shipment From NY to LA

Select Route?	From		To		Fuel Cost
0.0	1	New York	2	Cleveland	400.0
1.0	1	New York	3	St. Louis	950.0
0.0	1	New York	4	Nashville	800.0
0.0	2	Cleveland	5	Phoenix	1800.0
0.0	2	Cleveland	6	Dallas	900.0
1.0	3	St. Louis	5	Phoenix	1100.0
0.0	3	St. Louis	6	Dallas	600.0
0.0	4	Nashville	6	Dallas	600.0
0.0	4	Nashville	7	Salt Lake City	1200.0
1.0	5	Phoenix	8	Los Angeles	400.0
0.0	6	Dallas	5	Phoenix	900.0
0.0	6	Dallas	7	Salt Lake City	1000.0
0.0	6	Dallas	8	Los Angeles	1300.0
0.0	7	Salt Lake City	8	Los Angeles	600.0
				Total	2,450.0

Nodes		Net Flow	Supply/Demand
1	New York	-1	-1
2	Cleveland	0	0
3	St. Louis	0	0
4	Nashville	0	0
5	Phoenix	0	0
6	Dallas	0	0
7	Salt Lake City	0	0
8	Los Angeles	1	1

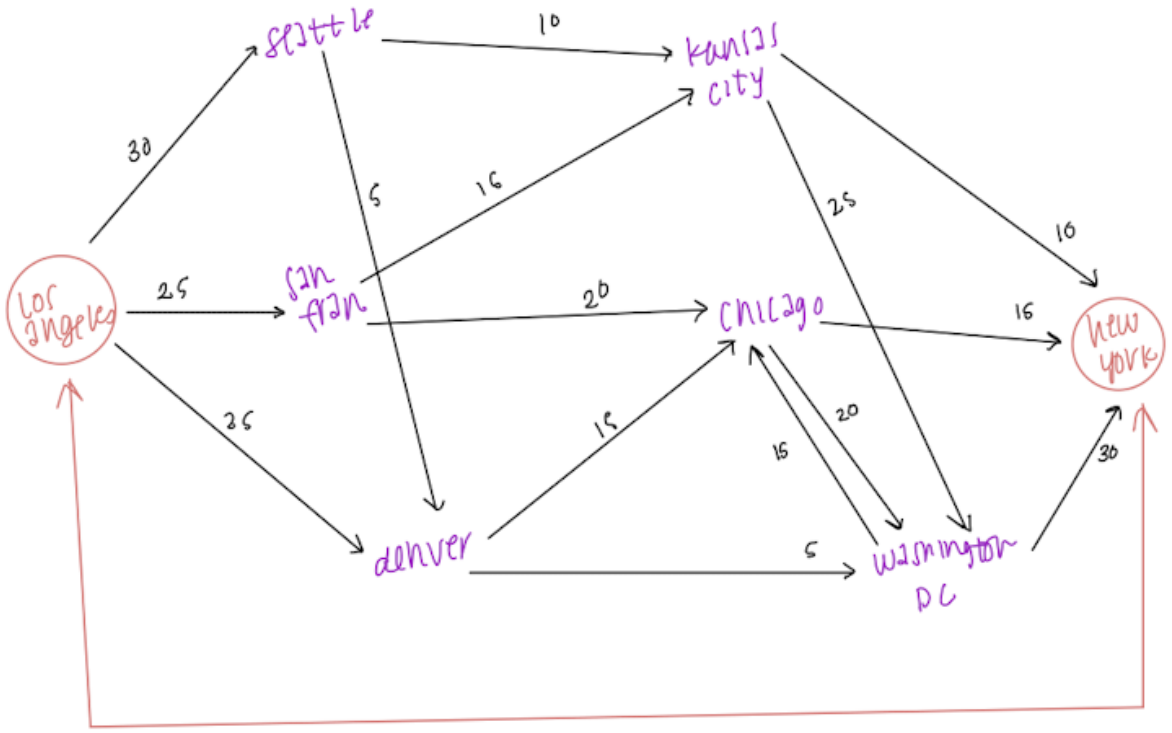
Spreadsheet

Solution

The minimum amount of fuel for a shipment from New York to Los Angeles is 2450 gallons. The trip that minimizes fuel consumption is: New York → St. Louis → Phoenix → Los Angeles.

Problem 2: Amazon Shipment Problem

Network Drawing



Spreadsheet

Amazon Warehouse Problem

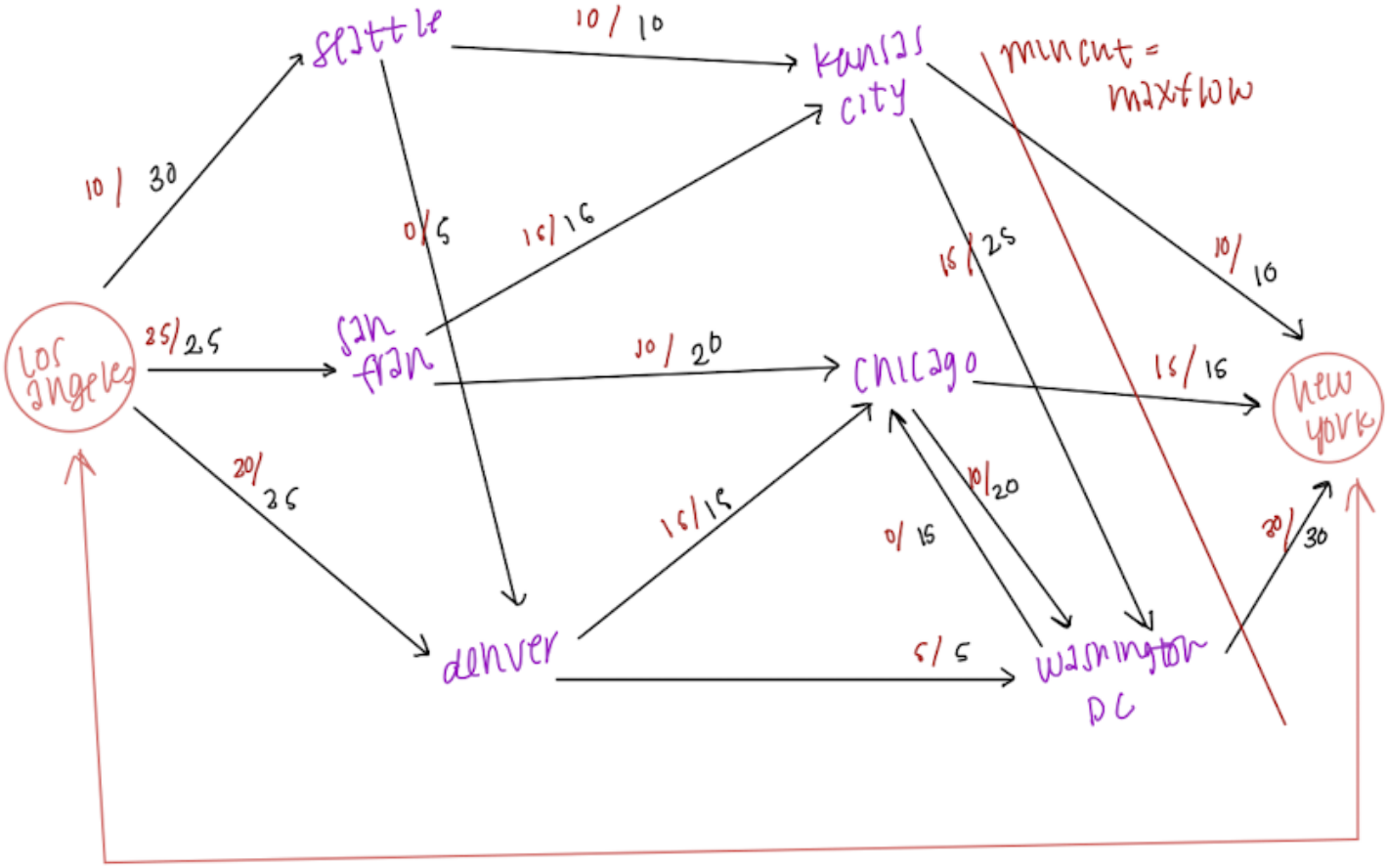
Units of Flow	From		To		Upper Bound
	-- Flight Segments --				
10.0	1	Los Angeles	2	Seattle	30
25.0	1	Los Angeles	3	San Fransisco	25
20.0	1	Los Angeles	4	Denver	35
10.0	2	Seattle	5	Kansas City	10
0.0	2	Seattle	4	Denver	5
15.0	3	San Fransisco	5	Kansas City	15
10.0	3	San Fransisco	6	Chicago	20
15.0	4	Denver	6	Chicago	15
5.0	4	Denver	7	Washington DC	5
15.0	5	Kansas City	7	Washington DC	25
10.0	5	Kansas City	8	New York	10
10.0	6	Chicago	7	Washington DC	20
15.0	6	Chicago	8	New York	15
30.0	7	Washington DC	8	New York	30
0.0	7	Washington DC	6	Chicago	15
55.0	8	New York	1	Los Angeles	9999

Nodes		Net Flow	Supply/Demand
1	Los Angeles	0	0
2	Seattle	0	0
3	San Fransisco	0	0
4	Denver	0	0
5	Kansas City	0	0
6	Chicago	0	0
7	Washington DC	0	0
8	New York	0	0

55.0 **Maximal Flow**

Solution

Amazon will be able to ship 52 tons of product overnight from Los Angeles to New York. Infact, there is the capacity to ship 55 tons of product.



Problem 3: FCC License Bidding Problem

FCC Licensing

Bids	A	B	C	D	E	F	G	H	I	J	314
1	42	49	49	50	44	41	44	41	45	45	314
2	42	47	43	45	44	44	49	43	44	48	
3	12	15	17	11	16	10	14	14	16	11	
4	19	14	11	11	19	18	20	13	17	20	
5	39	37	39	31	34	37	38	32	36	38	
6	39	32	40	34	33	34	40	39	37	32	
7	22	30	24	22	27	30	29	27	28	28	
8	22	26	29	26	29	20	26	29	26	27	
9	7	1	2	2	6	5	8	5	7	5	
10	7	3	9	2	8	5	3	8	4	3	
11	32	28	35	25	30	29	31	31	26	32	

$ 314 Maximal Revenue

Bids	A	B	C	D	E	F	G	H	I	J	Lease Number Given		Max Lease
1	0	0	0	1	0	0	0	0	0	0	1	<=	1
2	0	1	0	0	0	0	0	0	0	0	1	<=	1
3	0	0	0	0	0	0	0	0	1	0	1	<=	1
4	0	0	0	0	0	0	0	0	0	1	1	<=	1
5	1	0	0	0	0	0	0	0	0	0	1	<=	1
6	0	0	0	0	0	0	1	0	0	0	1	<=	1
7	0	0	0	0	0	1	0	0	0	0	1	<=	1
8	0	0	0	0	0	0	0	1	0	0	1	<=	1
9	0	0	0	0	0	0	0	0	0	0	0	<=	1
10	0	0	0	0	1	0	0	0	0	0	1	<=	1
11	0	0	1	0	0	0	0	0	0	0	1	<=	1
Total Leases Received	1	1	1	1	1	1	1	1	1	1			
	<=	<=	<=	<=	<=	<=	<=	<=	<=	<=			
	1	1	1	1	1	1	1	1	1	1			

BIDDER	BID 1	BID 2	BID 3	BID 4	BID 5	BID 6	BID 7	BID 8	BID 9	BID 10	BID 11
FCC LICENSE 1	D	B	I	J	A	G	F	H	N/A	E	C
FCC LICENSE 2	D	B	I	J	A	G	F	E	N/A	H	C

Spreadsheet

Solution

The allocation of licenses to bidders that maximizes the FCC's revenue can be given in two ways. Both of these ways give us 314 dollars in profit.

BIDDER	BID 1	BID 2	BID 3	BID 4	BID 5	BID 6	BID 7	BID 8	BID 9	BID 10	BID 11
FCC LICENSE 1	D	B	I	J	A	G	F	H	N/A	E	C
FCC LICENSE 2	D	B	I	J	A	G	F	E	N/A	H	C