BUSM3021
Business Analytics
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Homework 5

Due 11/28/2021

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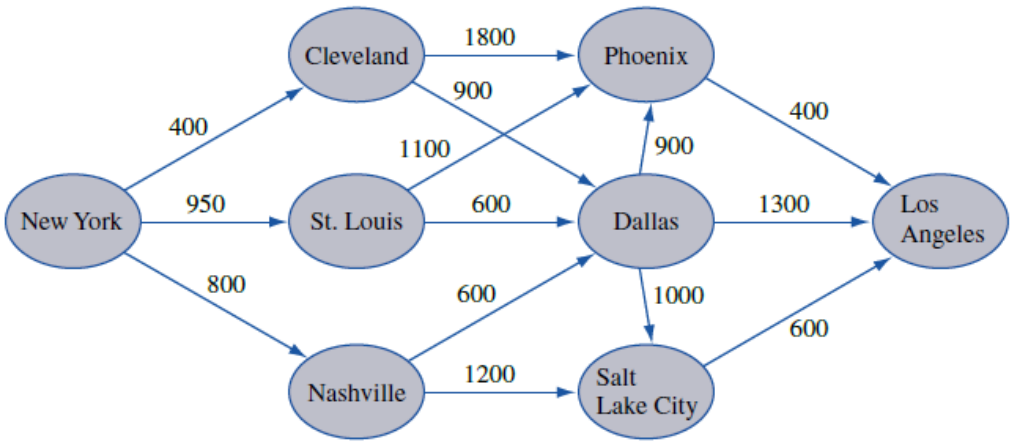
1. (35pts) A moving company is planning a shipment from New York to Los Angeles. The company will use a van and can take a number of possible routes, as illustrated in the following diagram. The diagram also shows the number of gallons of fuel required by the van on each arc.



Using Excel solver, create a model to find the route from New York to Los Angeles that uses the minimum amount of fuel.

2. (35pts) Amazon has 52 tons of product that needs to be shipped overnight from Los Angeles to New York. Amazon has a number of flights scheduled each night, and the shipping capacity on each of its flights is as follows:

Flights Segments	***Capacity (tons)***
Los Angeles to Seattle	*30*
Los Angeles to San Francisco	*25*
Los Angeles to Denver	*35*
Seattle to Kansas City	*10*
Seattle to Denver	*5*
San Francisco to Kansas City	*15*
San Francisco to Chicago	*20*
Denver to Chicago	*15*
Denver to Washington, D.C.	*5*
Kansas City to Washington, D.C.	*25*
Kansas City to New York	*10*
Chicago to Washington, D.C.	*20*
Chicago to New York	*15*
Washington, D.C. to New York	*30*
Washington, D.C. to Chicago	*15*

Create a network diagram for this problem and solve it by setting up a spreadsheet model. Will Amazon be able to ship the 52 tons of product?

3. (30pts) Consider the allocation of spectrum licenses to bidders that we saw in Lecture 2, shown in the table below (recall that each number in the table represent the amount a bidder is willing to pay for a license). As before, we assume that each bidder can get at most 1 license.

Bids	A	B	C	D	E	F	G	H	I	J
1	42	49	49	50	44	41	44	41	45	45
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

What is the allocation of licenses to bidders that maximizes the FCC's revenue?

Notes:

- If you encounter problems, please ask for help.
- You may discuss this assignment with one another, but you must *write up each assignment individually*. Note that this precludes copying material or from sharing computer files – the work you submit must be your own.
- Please put each problem on a separate page.
- It is not necessary to exhaustively list all the decision variables and constraints, and judicious use of summations or "…" will suffice as long as the structure of your overall formulation is clear.
- Copy and paste ***relevant*** parts of spreadsheets into Word (or equivalent) and incorporate an adequate explanation of your work. You are encouraged to also submit the spreadsheet, but that should only be as a supplement
- Handwritten work is acceptable (and encouraged) if legible and well organized.