HW - 6 Becerra

Saturday, February 20, 2021 10:11 PM

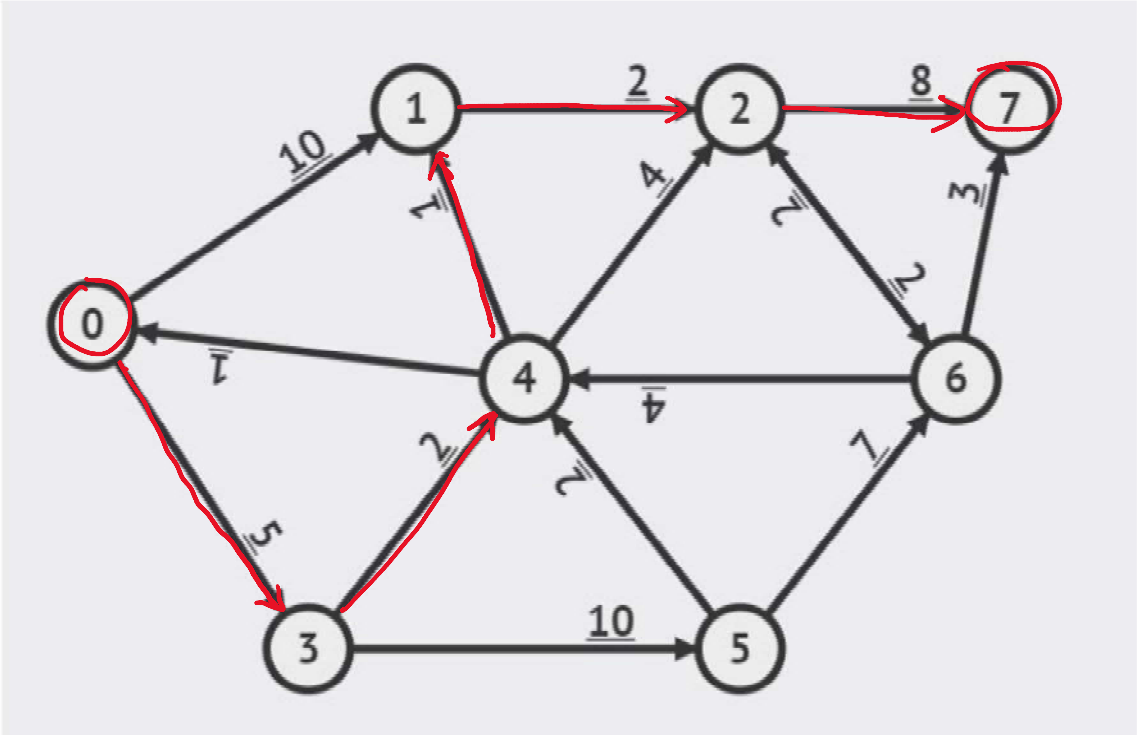
Problem 1

$Objective\ funtion = \max dt$

$Constraints =$

$ds = 0$

$dv - du \leq w(u,v)\ \forall\ (u,v) \in E$



a -

The shortest distance from a source vertex "s" to a terminal vertex "t" is found by taking all possible solutions in terms of the distances between s and t, and finding the smallest

d7 = {0,3,4,1,2,7}
d7 = 5+2+1+2+8 = 18

b -

d1 = {3, 4, 1}
d1 = 5 + 2 + 1 = 8

d2 = {3,4,1,2}
d2 = 5+2+1+2=10

d3 = {3}
d3 = 5

d4 = {3,4}
d4 = 5+2 = 7

d5 = {3,5}
d5 = 5+10=15

d6 = {3, 4,2,6}

d6 = 5+2+4+2 = 13

Problem 2

Constraints -

Minimum amount sold per tie per month

$6000 \leq s \leq 7000$
$10000 \leq p \leq 14000$
$13000 \leq b \leq 16000$
$6000 \leq c \leq 8500$

Material used per type per month

$0.125S \leq 1000$
$0.08p + 0.05b + 0.03c \leq 2000$
$0.05b + 0.07c \leq 1250$

Objective -

Max p

p = s(6.70-0.75-(0.125*20)) + p(3.55-0.75-(.08*6)) + b(4.31-.075-(0.05*6+ 0.05*9)) + c(4.81-0.75-(0.03*6+0.07*9))

p = s(3.45) + p(2.32) + b(2.81) + c(3.25)

Profit:	$ 120,196.00	
Type of tie	Profit per tie	Number of ties
Silk(s)	$ 3.45	7000
Polyester(p)	$ 2.32	13625
Blend 1(b)	$ 2.81	13100
Blend 2(c)	$ 3.25	8500
Total ties		42225

Excel file named "maximizeProfitsTies"

Problem 3

a -

i -

Objective

Minimize calories
min (calories = t(21) + l(16) + s(40) + c(41) +ss(585)+st(120)+cp(164)+o(884))

Constraints

$protein \geq 15g$
$2g \leq fat \leq 8g$
$carbs \geq 4g$
$sodium \leq 200mg$
$spinach + lettuce \geq 40\%$

ii -

Included in Excel file named "minimizeCalories"

iii -

Total Calories	114.75		Total Cost	$ 2.33			
Ingredients	Calories	Protein(g)	Fat(g)	Carb(g)	Sodium(mg)	cost(100g)	Servings
tomato	21	0.85	0.33	4.64	9	$ 1.00	0
lettuce	16	1.62	0.2	2.37	28	$ 0.75	0.585480711
spinach	40	2.86	0.39	3.63	65	$ 0.50	0
carrot	41	0.93	0.24	9.58	69	$ 0.50	0
sunflower seeds	585	23.4	48.7	15	3.8	$ 0.45	0
smoked tofu	120	16	5	3	120	$ 2.15	0.878220078
chickpeas	164	9	2.6	27	78	$ 0.95	0
oil	884	0	100	0	0	$ 2.00	0

b-

i -

Objective

Minimize cost

min (cost= t(1) + l(.75) + s(.5)+ c(.5)+ ss(.45) + st(2.15)+cp(.95) + o(2))

Constraints

$protein \geq 15g$

$2g \leq fat \leq 8g$

$carbs \geq 4g$

$sodium \leq 200mg$

$spinach + lettuce \geq 40\%$

ii -

Included in Excel file named "minimize cost"

iii -

Total Calories	278.49		Total Cost	$ 1.55			
Ingredients	Calories	Protein(g)	Fat(g)	Carb(g)	Sodium(m	cost(100g)	Servings
tomato	21	0.85	0.33	4.64	9	$ 1.00	0
lettuce	16	1.62	0.2	2.37	28	$ 0.75	0
spinach	40	2.86	0.39	3.63	65	$ 0.50	0.832298354
carrot	41	0.93	0.24	9.58	69	$ 0.50	0
sunflower seeds	585	23.4	48.7	15	3.8	$ 0.45	0.096083302
smoked tofu	120	16	5	3	120	$ 2.15	0
chickpeas	164	9	2.6	27	78	$ 0.95	1.152364159
oil	884	0	100	0	0	$ 2.00	0

Problem 4

Objective-

min fridge

constraints -

p1w1+p1w2+p1w3 = 150

p2w1+p2w2+p2w3 = 450

p3w1+p3w2+p3w3 = 250

p4w1+p4w2+p4w3 = 150

Max Refrigerators

Total Cost	$ 17,100.00

Cost	W1	W2	W3
P1	10	15	100000
P2	11	8	100000
P3	13	8	9
P4	100000	14	8

Cost	R1	R2	R3	R4	R5	R6	R7
W1	5	6	7	10	100000	100000	100000
W2	100000	100000	12	8	10	14	100000
W3	100000	100000	100000	14	12	12	6

Supply to Warehouse	W1	W2	W3	
P1	150	0	0	150
P2	200	250	0	450
P3	0	150	100	250
P4	0	0	150	150
	350	400	250	

Supply from Warehouse	R1	R2	R3	R4	R5	R6	R7	
W1	100	150	100	0	0	0	0	350
W2	0	0	0	200	200	0	0	400
W3	0	0	0	0	0	150	100	250
	100	150	100	200	200	150	100	