Name(s): Raunav Sharma

	A	B	C	D	E	F
1						
2	Travel time per call from each district to each hospital					
3	District	Bayview	Lake shore		Calls/hour	
4	1	5	8		0.5	
5	2	6	9		0.6	
6	3	7	10		0.4	
7	4	5	7		0.3	
8	5	6	8		0.4	
9	6	7	9		0.6	
10	7	9	5		0.7	
11	8	10	6		0.9	
12	9	11	7		1	
13	10	7	3		0.2	
14	11	8	4		0.6	
15	12	3	5		0.1	
16	Number of calls per hour routed from each district to each hospital					
17	District	Bayview	Lake shore	Sum		Calls/hour
18	1	0.5	0	0.5	=	0.5
19	2	0.6	0	0.6	=	0.6
20	3	0.4	0	0.4	=	0.4
21	4	0.3	0	0.3	=	0.3
22	5	0.4	0	0.4	=	0.4
23	6	0.6	0	0.6	=	0.6
24	7	0	0.7	0.7	=	0.7
25	8	0.3	0.6	0.9	=	0.9
26	9	1	0	1	=	1
27	10	0	0.2	0.2	=	0.2
28	11	0.6	0	0.6	=	0.6
29	12	0.1	0	0.1	=	0.1
30	Sum	4.8	1.5			
31		<=	<=			
32	Capacity	4.9	1.5			
33	Total Travel Time	43.8				

The City of Port Charles has two hospitals. (Bayview Hospital and Lakeshore Hospital) Bayview Hospital has 4 ambulances and Lakeshore Hospital has 2 ambulances. Queueing theory (done outside of this problem) indicates that Bayview can be assigned up to 4.9 calls per hour and that Lakeshore can be assigned up to 1.5 calls per hour. Port Charles has been divided into 12 districts. The travel time per call in each district and the average number of calls per hour emanating from each district are given in table to the left.

The objective is to minimize the average travel time needed to respond to a call. Determine the proper assignment of districts (NOT individual ambulances) to hospitals. A given district's calls do not all have to be assigned to the same hospital. Since these are averages, fractional assignments are expected. Create the written model and formulate in solver. (network diagram not required) HINT: you are not scheduling individual ambulances, only allocating calls per hour to each hospital.

	A	B	C	D	E	F	G	H	I
1									
2	Cash Needed	$ 5,000.00	$ 6,000.00	$ 3,000.00	$ 2,000.00	$ 7,000.00	$ 2,000.00	$ 3,000.00	
3									
4	Cash in hand	3000							
5	withdrawal cost	10							
6	OC	0.2							
7									
8									
9									
10									
11		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
12	Withdrawal	$279,621.00	$7,996.00	$10,994.00	$12,993.00	$19,990.00	$21,988.00	$24,987.00	
13	Cash in Hand	$ 3,000.00	$(2,000.00)	$ (8,000.00)	$(11,000.00)	$(13,000.00)	$(20,000.00)	$(22,000.00)	
14	Total	$ 282,621.00	$ 5,996.00	$ 2,994.00	$ 1,993.00	$ 6,990.00	$ 1,988.00	$ 2,987.00	
15		>=	>=	>=	>=	>=	>=	>=	
16	Cash Needed	$ 5,010.00	$ 6,010.00	$ 3,010.00	$ 2,010.00	$ 7,009.99	$ 2,009.99	$ 3,009.99	
17									
18	Withdrawal Cos	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 10.00	$ 70.00
19	OC	$ -	$ (0.00)	$ (0.00)	$ (0.00)	$ (0.01)	$ (0.01)	$ (0.01)	$ (0.03)
20								Total Cost	$ 69.97

You need to withdraw money from an interest-bearing savings account A into a short-term, daily use cash account B, where B is much like a petty cash account. You move money from A to B so that you can pay for various needs. Every time you withdrawal money from A and put it into B, you must pay a $10 service few no matter how much you withdraw. You must have enough in account B to meet any requirements for that day - you must pay on time. So for instance, if you move 6,000 into acount B on Day 1 so that you can meet payments of 4,000 today (Day 1) and 2,000 tomorrow (Day 2), then you will need to withdraw more on Day 3 to meet whatever requirements you might have.

On Monday morning, you have $3000 in cash on hand in the daily use account. For the next seven days, the following cash requirements **must** be met: Monday, $5000; Tuesday, $6000; Wednesday, $3000; Thursday, $2000; Friday, $7000; Saturday, $2000; Sunday, $3000. At the beginning of each day, you must decide how much money (if any) to withdraw from the interest-bearing account into the daily cash account. It costs $10 to make a withdrawal of any size. You believe that the opportunity cost of having $1 of cash on hand for a year is $0.20. Assume that opportunity costs are incurred on each day's ending balance ($0.20/365). If you pull money from an account that pays interest when you don't need it that day, then you are forgoing the interest for that day - an opportunity cost. Determine how much money you should withdraw from the bank during each of the next seven days.

Problem 5.37

	A	B	C	D
12		Basic	Deluxe	Net
13	Quantity	3286	2857	
14	Cost per unit	40	100	
15	Total cost	131440	285700	417140
16	labor per unit	10	20	
17	total labor	32860	57140	90000
18	price per unit	117.14	207.145	
19	net revenue	384922.04	591813.3	976735.3
20	complexity penalty	93881.02		
21	profit	$ 465,714.29		

A company makes a product in a basic form and a deluxe form, with costs of $40 and $100 per unit respectively. The per unit price for the Basic is $150 - 0.01*Xb where Xb is the number of Basics sold. Similarly, the per unit price for the deluxe is $250-0.015*Xd, where Xd is the number of units of Deluxe sold.

Because of the complexity of the producing the two products together in the same process, the company estimates that there is a complexity penalty cost of $0.01 times the number of Basics sold times the number of Deluxe sold.

Each Basic unit requires 10 minutes of assembly labor and each deluxe 20 minutes. The company has 1500 labor hours available.

Find Xb and Xd such that profit is maximized.

Problem 6.18