## **Chapter 7 Review Solutions**

Exercises 1-6, 8-11, 15-16, 23, 25

1. After using the NW corner rule and apply MODI (modified distribution), or the "u-v" method, we get:

	C	1	C	2	C	3	
		75		60		69	
P 1	20				30	<u> </u>	50
		79		73		68	
P 2	10		90				100
		85		76		70	
P 3	50						50
		0		0		0	
Dummy				·	70		70
Demand	80		90		100		

3. To set this up, think of Jan, Feb and March having both a supply and demand- The supplies being 35, 30 and 35, respectively, and the demands being 30, 30, 20, 20, respectively.

Here is the optimal solution:

	Ja	an	Fe	eb	М	ar	Dun	nmy	
		400		420		440		0	
Jan	30		5						35
		425		420		440		0	
Feb			10				20		30
		420		415		410		0	
Mar			15		20				35
Demand	30		30		20		20		

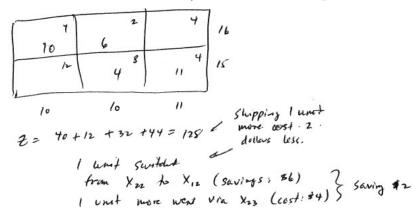
5. To set it up, think of the hard drive (HD), the computer memory (CM), and the computer tape (CT) as being the supplies- 200, 100 and 300 each. Then they (computer packets) can be "delivered" as word processing (WP), packaged program (PP), data

file (DF), with "demands" 300, 100 and 100. The costs are costs in time. Notice that Table 68 does need to be modified for our final costs- For example, if WP is accessed 8 times a month, then the time costs for the HD, CM and CT are  $8 \times [5, 2, 10]$ , or [40, 16, 80]. Here is the optimal tableau:

	W	P	C	М	С	Т	Dur	nmy	
		40		16		8		0	
WP	200		0						200
		16		4		2		0	
PP	100			L					100
		80		32		12		0	
$\mathrm{DF}$			100		100		100		300
Demand	300		100		100		100		

- 8. Notice that we needed a dummy column to proceed. An optimal solution:  $x_{11} = 40$ ,  $x_{12} = 10$ ,  $x_{22} = 50$ ,  $x_{32} = 10$ , and  $x_{34} = 30$ .
- 9. The LP is equivalent to a  $2 \times 2$  transportation problem. Taking  $x_1, x_2$  for the first row and  $x_3, x_4$  for the second row, the optimal solution is 3, 1, 0, 5, respectively.
- 10. You should find that the optimal solution is given by

11. (TYPO:  $s_i$  should be  $s_1 = 16$ ). Here's the new optimum:



15. Since the change is to the cost for a NBV, changing it will only result in changing that value of  $c_{ij} - (u_i + v_j)$ , which in this case:

$$(7+\Delta) - (3+2) = 2 + \Delta > 0 \quad \Rightarrow \quad \Delta > -2$$

Therefore, the value of  $c_{24}$  can range in the interval  $[5, \infty)$ 

NOTE: It's OK to leave the value of 0 out- This would permit a multiple optimal solution, but the current solution would still be one of them.

16. This changes the cost associated to a basic variable, so we will have to re-work the our u, v computations. Solving the resulting inequalities should yield  $-2 \leq \Delta \leq 2$ , so the current basis remains optimal for  $11 \leq c_{23} \leq 15$ .

J.	-6-A	V2 = 6	33= 10	¥4 <sup>≈1</sup>
,	8	6	N	9
4,70	(2+4)	10	25	(7)
1	9	12	1350	7
3+0	45	(3-0)	5	(2-0)
310		4	16	5
43 * 3	(15+6)	10	(1)	30

23. Two notes that might help you construct this one- Since customers three has two demands, split it into two columns- one for the regular demand, and one for the extra demand. We will need a dummy plant to make the problem balanced.

Further, we are going to maximize the profit in this problem, not minimize. Therefore, we don't want to use M for the "profit" from the dummy plant to the customer- Rather, we can use -M. The tableau is given below- We have given supply and demand in thousands.

	$C_1$	$C_2$	$C_{31}$	$C_{32}$	$C_4$	
$P_1$	65	63	62	62	64	3
$P_2$	68	67	65	65	62	5
$P_3$	63	60	59	59	60	5
D	-M	$63 \\ 67 \\ 60 \\ -M$	-M	0	0	3
		3			3	