CH5/18. Initial tableau (Note: Min objective converted to Max.)

Basis	c_B	x_1	x_2	x_3	s_1	s_2	s_3	a_2	a_3		b_i / a_{i1}
		-84	-4	-30	0	0	0	-M	-M		
s_1	0	8	1	3	1	0	0	0	0	240	240/8 = 30
a_2	-M	16	1	7	0	-1	0	1	0	480	480/16 = 30
a_3	-M	8	-1	4	0	0	-1	0	1	160	160/8 = 20
	z_j	-24M	0	-11M	0	M	M	-M	-M	-640M	
	$c_j - z_j$	-84+24M	-4	-30+11M	0	-M	-M	0	0		

Iteration 1: x_1 enters, a_3 leaves (Drop a_3 column)

Basis	c_B	x_1	x_2	x_3	s_1	s_2	s_3	a_2	
		-84	-4	-30	0	0	0	-M	
s_1	0	0	2	-1	1	0	1	0	80
a_2	-M	0	3	-1	0	-1	2	1	160
x_1	-84	1	-1/8	1/2	0	0	-1/8	0	20
	z_j	-84	$^{21}/_2$ - 3M	42+M	0	M	$^{21}/_2$ - 2M	-M	-1680-160M
	$c_j - z_j$	0	$^{-29}/_2$ + 3M	-72-M	0	-M	$^{-21}/_2$ +2M	0	

Iteration 2: x_2 enters, s_1 leaves

Basis	c_B	x_1	x_2	x_3	s_1	s_2	s_3	a_2	
		-84	-4	-30	0	0	0	-M	
x_2	-4	0	1	-1/2	1/2	0	1/2	0	40
a_2	-M	0	0	1/2	-3/2	-1	1/2	1	40
x_1	-84	1	0	7/16	1/16	0	-1/16	0	25
	z_j	-84	-4	$\frac{-139}{4} - \frac{M}{2}$	$\frac{-29}{4} + \frac{3M}{2}$	M	$\frac{13}{4} - \frac{M}{2}$	-M	-2260-100M
	$c_j - z_j$	0	0	$\frac{19}{4} + \frac{M}{2}$	$\frac{29}{4} - \frac{3M}{2}$	-M	$\frac{-13}{4} + \frac{M}{2}$	0	

Iteration 3: x_3 enters, x_1 leaves

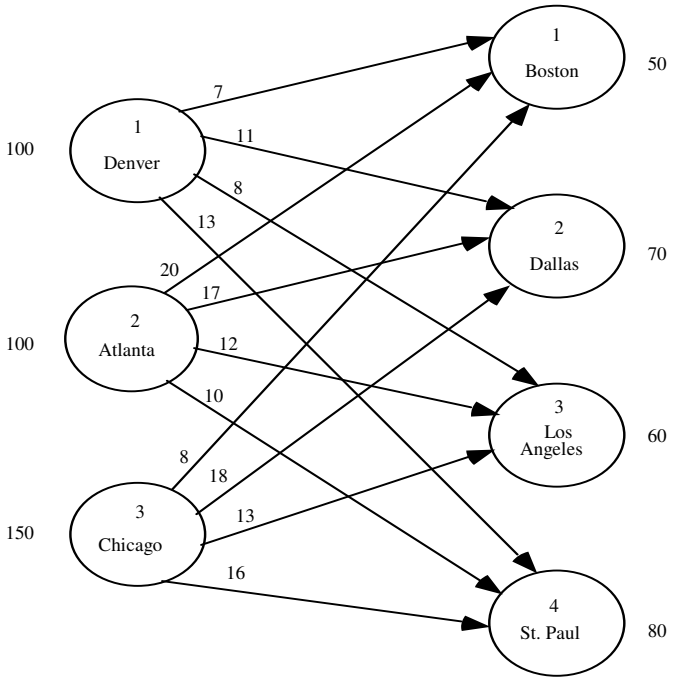
Basis	c_B	x_1	x_2	x_3	s_1	s_2	s_3	a_2	
		-84	-4	-30	0	0	0	-M	
x_2	-4	8/7	1	0	4/7	0	3/7	0	480/7
a_2	-M	-8/7	0	0	-11/7	-1	4/7	1	80/7
x_3	-30	16/7	0	1	1/7	0	-1/7	0	400/7
	z_j	$\frac{-512+8M}{7}$	-4	-30	$\frac{-46+11M}{7}$	M	$\frac{-42-4M}{7}$	-M	$\frac{-13920 - 80M}{7}$
	$c_j - z_j$	$\frac{-76-8M}{7}$	0	0	$\frac{46-11M}{7}$	-M	$\frac{42+4M}{7}$	0	

Iteration 4: s_3 enters, a_2 leaves (Drop a_2 column)

Basis	c_B	x_1	x_2	x_3	s_1	s_2	s_3	
		-84	-4	-30	0	0	0	
x_2	-4	2	1	0	7/4	3/4	0	60
s_3	0	-2	0	0	-11/4	-7/4	1	20
x_3	-30	2	0	1	-1/4	-1/4	0	60
	z_j	-68	-4	-30	1/2	9/2	0	-2040
	$c_j - z_j$	-16	0	0	-1/2	-9/2	0	

Optimal Solution: $x_2 = 60, x_3 = 60, s_3 = 20$ Value = 2040

CH7/11. a.



b. There are alternative optimal solutions.

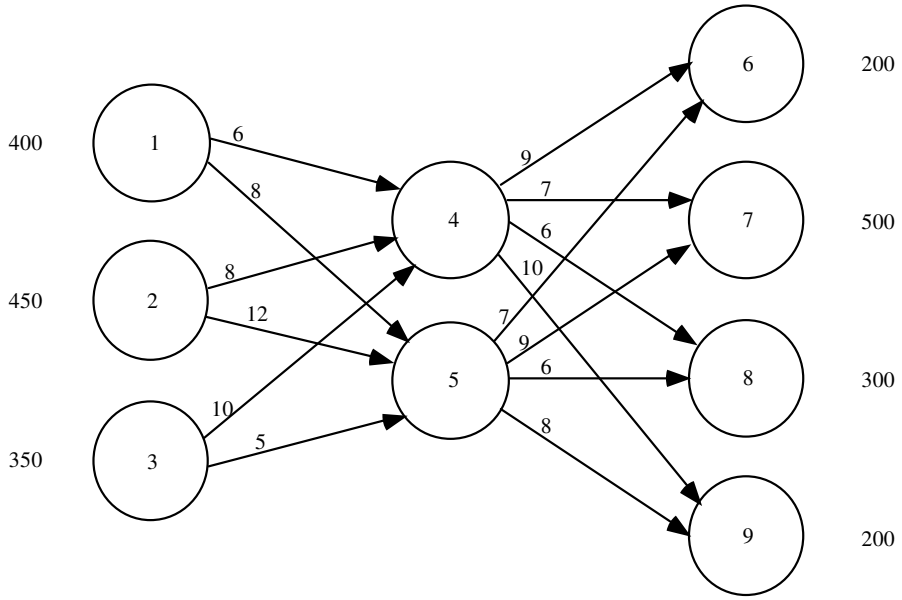
Solution #1		Solution # 2	
Denver to St. Paul:	10	Denver to St. Paul:	10
Atlanta to Boston:	50	Atlanta to Boston:	50
Atlanta to Dallas:	50	Atlanta to Los Angeles:	50
Chicago to Dallas:	20	Chicago to Dallas:	70
Chicago to Los Angeles:	60	Chicago to Los Angeles:	10
Chicago to St. Paul:	70	Chicago to St. Paul:	70

Total Profit: $4240

If solution #1 is used, Forbelt should produce 10 motors at Denver, 100 motors at Atlanta, and 150 motors at Chicago. There will be idle capacity for 90 motors at Denver.

If solution #2 is used, Forbelt should adopt the same production schedule but a modified shipping schedule.

CH7/27a.



b.

Min

$$6x_{14}+8x_{15}+8x_{24}+12x_{25}+10x_{34}+5x_{35}+9x_{46}+7x_{47}+6x_{48}+10x_{49}+7x_{56}+9x_{57}+6x_{58}+8x_{59}$$

s.t.

$$\begin{aligned}
x_{14}+x_{15} &\le 400\\
x_{24}+x_{25} &\le 450\\
x_{34}+x_{35} &\le 350\\
-x_{14}-x_{24}-x_{34}+x_{46}+x_{47}+x_{48}+x_{49} &= 0\\
-x_{15}-x_{25}-x_{35}+x_{56}+x_{57}+x_{58}+x_{59} &= 0\\
x_{46}+x_{56} &= 200\\
x_{47}+x_{57} &= 500\\
x_{48}+x_{58} &= 300\\
x_{49}+x_{59} &= 200
\end{aligned}$$

$$x_{ij} \ge 0 \text{ for all } i, j$$

c. Optimal Solution

Variable	Value
x_{14}	400
x_{15}	0
x_{24}	450
x_{25}	0
x_{34}	0
x_{35}	350
x_{46}	0
x_{47}	500
x_{48}	300
x_{49}	50
x_{56}	200
x_{57}	0
x_{58}	0
x_{59}	150

Value of optimal solution: 16150