

A Scheduling Problem

A small air freight company provides service between the five cities shown in the route map of Figure 8.9. The route map shows the flights that the company provides, their flight numbers, and (in parentheses) the time in hours that each flight takes, including time in transit and average landing delays. The company guarantees to its customers that each flight on the route map will be flown at least once every day, but does not specify the precise times of the flights. The company employs four pilots. Pilots Able and Baker live in Plattsburgh, while Smith and Jones live in Jamestown.

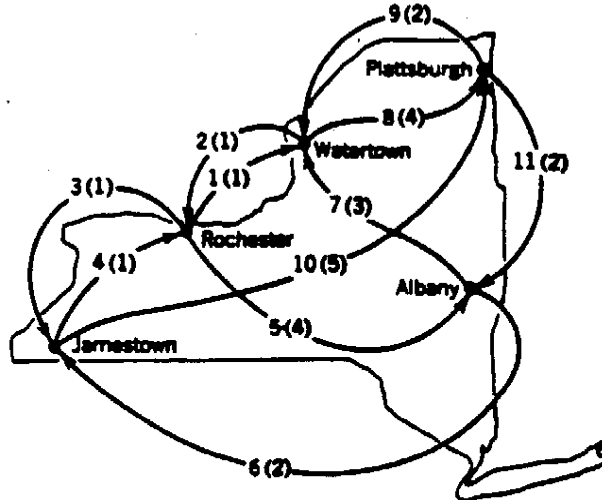


FIGURE 8.9 Air Freight Route Map.

TABLE 8.1 Feasible Routes in the Air Freight Network

Route Number, j	Feasible for Pilots	Flights in the Route	Cost c_j
1	A, B	9, 8	80
2	A, B	11, 7, 8	120
3	A, B	9, 2, 1, 8	120
4	A, B, S, J	9, 2, 3, 4, 1, 8	160
5	A, B, S, J	11, 6, 4, 1, 8	150
6	A, B, S, J	11, 6, 10	120
7	A, B, S, J	9, 2, 3, 10	130
8	S, J	4, 3	40
9	S, J	4, 5, 6	100
10	S, J	4, 1, 2, 3	80
11	S, J	4, 1, 2, 5, 6	140
12	S, J	4, 5, 7, 2, 3	150

1	2	3	4	5	6	7	8	9	10	11	12			
(routes)														
0	0	1	1	1	0	0	0	0	1	1	0	$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \\ x_7 \\ x_8 \\ x_9 \\ x_{10} \\ x_{11} \\ x_{12} \end{bmatrix}$	$\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$	$\begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \end{bmatrix}$
0	0	1	1	0	0	1	0	0	1	1	1			
0	0	0	1	0	0	1	1	0	1	0	1			
0	0	0	1	1	0	0	1	1	1	1	1			
0	0	0	0	0	0	0	0	1	0	1	1			
0	0	0	0	1	1	0	0	1	0	1	0			
0	1	0	0	0	0	0	0	0	0	0	1			
1	1	1	1	1	0	0	0	0	0	0	0			
1	1	1	1	0	0	1	0	0	0	0	0			
0	0	0	0	0	1	1	0	0	0	0	0			
0	0	0	0	1	1	0	0	0	0	0	0			