by constructing the appropriate parameter table. Compare this transportation problem with the one formulated in part (*a*).

(e) Repeat part (*b*) for the problem as formulated in part (*d*). Compare the BF solution obtained with the one from part (*b*).

D,I **8.3-6.** Starting with Vogel's approximation method, interactively apply the transportation simplex method to solve the Job Shop Co. assignment problem as formulated in Table 8.26*b*. (As stated in Sec. 8.3, the resulting optimal solution has $x_{14} = 1$, $x_{23} = 1$, $x_{31} = 1$, $x_{42} = 1$, and all other $x_{ij} = 0$.)

8.3-7. Reconsider Prob. 8.1-6. Now assume that distribution centers 1, 2, and 3 must receive exactly 10, 20, and 30 units per week, respectively. For administrative convenience, management has decided that each distribution center will be supplied totally by a single plant, so that one plant will supply one distribution center and the other plant will supply the other two distribution centers. The choice of these assignments of plants to distribution centers is to be made solely on the basis of minimizing total shipping cost.

(a) Formulate this problem as an assignment problem by constructing the appropriate cost table, including identifying the corresponding assignees and tasks.

C (b) Obtain an optimal solution.

(c) Reformulate this assignment problem as an equivalent transportation problem (with four sources) by constructing the appropriate parameter table.

C (d) Solve the problem as formulated in part (*c*).

(e) Repeat part (*c*) with just two sources.

C (f) Solve the problem as formulated in part (*e*).

8.3-8. Consider the assignment problem having the following cost table.

		Job		
		1	2	3
Person	A	5	7	4
	B	3	6	5
	C	2	3	4

The optimal solution is A-3, B-1, C-2, with $Z = 10$.

C (a) Use the computer to verify this optimal solution.

(b) Reformulate this problem as an equivalent transportation problem by constructing the appropriate parameter table.

C (c) Obtain an optimal solution for the transportation problem formulated in part (*b*).

(d) Why does the optimal BF solution obtained in part (*c*) include some (degenerate) basic variables that are not part of the optimal solution for the assignment problem?

(e) Now consider the *nonbasic* variables in the optimal BF solution obtained in part (*c*). For each nonbasic variable x_{ij} and the corresponding cost c_{ij}, adapt the sensitivity analysis procedure for general linear programming (see Case 2*a* in Sec. 6.7) to determine the *allowable range to stay optimal for* c_{ij}.

8.3-9. Consider the linear programming model for the general assignment problem given in Sec. 8.3. Construct the table of constraint coefficients for this model. Compare this table with the one for the general transportation problem (Table 8.6). In what ways does the general assignment problem have more special structure than the general transportation problem?

I **8.4-1.** Reconsider the assignment problem presented in Prob. 8.3-2. Manually apply the Hungarian algorithm to solve this problem. (You may use the corresponding interactive procedure in your IOR Tutorial.)

I **8.4-2.** Reconsider Prob. 8.3-4. See its formulation as an assignment problem in the answers given in the back of the book. Manually apply the Hungarian algorithm to solve this problem. (You may use the corresponding interactive procedure in your IOR Tutorial.)

I **8.4-3.** Reconsider the assignment problem formulation of Option 2 for the Better Products Co. problem presented in Table 8.29. Suppose that the cost of having Plant 1 produce product 1 is reduced from 820 to 720. Solve this problem by manually applying the Hungarian algorithm. (You may use the corresponding interactive procedure in your IOR Tutorial.)

I **8.4-4.** Manually apply the Hungarian algorithm (perhaps using the corresponding interactive procedure in your IOR Tutorial) to solve the assignment problem having the following cost table:

		Job		
		1	2	3
Person	1	M	8	7
	2	7	6	4
	3(*D*)	0	0	0

I **8.4-5.** Manually apply the Hungarian algorithm (perhaps using the corresponding interactive procedure in your IOR Tutorial) to solve the assignment problem having the following cost table:

		Task			
		1	2	3	4
Assignee	A	4	1	0	1
	B	1	3	4	0
	C	3	2	1	3
	D	2	2	3	0

I **8.4-6.** Manually apply the Hungarian algorithm (perhaps using the corresponding interactive procedure in your IOR Tutorial) to solve the assignment problem having the following cost table:

		Task			
		1	2	3	4
Assignee	A	4	6	5	5
	B	7	4	5	6
	C	4	7	6	4
	D	5	3	4	7