Example 1 (3.10)

Sailco Corporation must determine how many sailboats should be produced during each of the next four quarters (one quarter = three months). The demand during each of the next four quarters is as follows: first quarter, 40 sailboats; second quarter, 60 sailboats; third quarter, 75 sailboats; fourth quarter, 25 sailboats. Sailco must meet demands on time. At the beginning of the first quarter, Sailco has an inventory of 10 sailboats. At the beginning of each quarter, Sailco must decide how many sailboats should be produced during that quarter. For simplicity, we assume that sailboats manufactured during a quarter can be used to meet demand for that quarter. During each quarter, Sailco can produce up to 40 sailboats with regular-time labor at a total cost of $400 per sailboat. By having employees work overtime during a quarter, Sailco can produce additional sailboats with overtime labor at a total cost of $450 per sailboat.

At the end of each quarter (after production has occurred and the current quarter's demand has been satisfied), a carrying or holding cost of $20 per sailboat is incurred. Use linear programming to determine a production schedule to minimize the sum of production and inventory costs during the next four quarters.

Example, Section 3.10 (Multiperiod Problems)

(Exercise 3, p. 104)

James Beerd bakes cheesecakes and Black Forest cakes. During any month, he can bake at most 65 cakes. The costs per cake and the demands for cake, which must be met on time, are listed below. It costs 50 cents to hold a cheesecake and 40 cents to hold a Black Forest cake in inventory for a month. Formulate an LP to minimize the total cost of meeting the next three months' demands.

		Demand	Cost/Cake
• Month 1:	Cheesecake	40	3.00
	Black Forest	20	2.50
• Month 2:	Cheesecake	30	3.40
	Black Forest	30	2.80
• Month 3:	Cheesecake	20	3.80
	Black Forest	10	3.40

Here is the solution in LINDO:

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LP OPTIMUM FOUND AT STEP      4

        OBJECTIVE FUNCTION VALUE

        1)      464.5000

  VARIABLE        VALUE          REDUCED COST
        C1        40.000000          0.000000
        C2        30.000000          0.000000
        C3        20.000000          0.000000
        B1        25.000000          0.000000
        B2        35.000000          0.000000
        B3         0.000000          0.100000
        I1         0.000000          0.000000
        I2         0.000000          0.200000
        I3         0.000000          4.300000
        L1         5.000000          0.000000
        L2        10.000000          0.000000
        L3         0.000000          3.700000
```