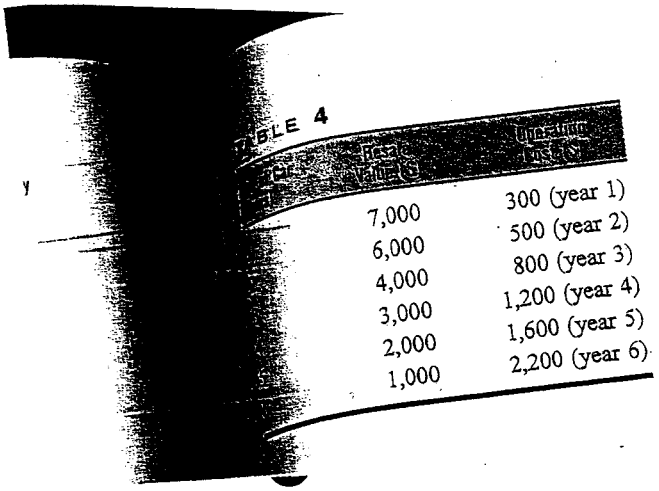

TABLE 4

7,000	300 (year 1)
6,000	500 (year 2)
4,000	800 (year 3)
3,000	1,200 (year 4)
2,000	1,600 (year 5)
1,000	2,200 (year 6)

5 Suppose it costs \$10,000 to purchase a new car. The annual operating cost and resale value of a used car are shown in Table 4. Assuming that one now has a new car, determine a replacement policy that minimizes the net costs of owning and operating a car for the next six years.

16 During the next four months, a construction firm must complete three projects. Project 1 must be completed within three months and requires 8 months of labor. Project 2 must be completed within four months and requires 10 months of labor. Project 3 must be completed at the end of two months and requires 12 months of labor. Each month, 8 workers are available. During a given month, no more than 6 workers can work on a single job. Formulate a maximum-flow problem that could be used to determine whether all three projects can be completed on time. (*Hint:* If the maximum flow in the network is 30, then all projects can be completed on time.)

General model.

x_{ij}= the amount of flow along arc (i,j).

c_{ij}= the cost of send 1 unit of flow along arc (i,j)

u_{ij}= the max capacity along arc (i,j)

b(i)= the amount of supply(+)/demand(-) at a node.

LP formulation

$\min \Sigma_{(i,j)\in A} c_{ij}x_{ij}$

subject to

$-\Sigma_{\{j:(j,i)\in A\}} x_{ji} + \Sigma_{\{j:(i,j)\in A\}} x_{i,j} = b(i)$ for all $i \in N$

$0 \le x_{ij} \le u_{ij}$ for all $(i,j) \in A$

Formulations:

As part of its food service, a caterer needs d_j napkins for each day of the upcoming week. He can buy new napkins at the price of c cents each or have his napkins laundered. The regular laundry service requires two working days and costs l cents per napkin and the expedited takes one day and requires a cost of m cents. (l<m). The problem is to determine a purchasing and laundry policy that meets the demand at the minimum possible cost. Formulate this problem as a minimum cost flow problem.