Problems Page 2

4.6. Ed Butler is the production manager for the Bilco Corporation, which produces three types of spare parts for automobiles. The manufacture of each part requires processing on each of two machines, with the following processing times (in hours):

	Part		
Machine	**A**	**B**	**C**
1	0.02	0.03	0.05
2	0.05	0.02	0.04

Each machine is available 40 hours per month. Each part manufactured will yield a unit profit as follows:

	Part		
	A	**B**	**C**
Profit	$50	$40	$30

Ed wants to determine the mix of spare parts to produce to maximize total profit.

a. Identify both the activities and the resources for this resource-allocation problem.

E* *b.* Formulate a linear programming model for this problem on a spreadsheet.

E* *c.* Make three guesses of your own choosing for the optimal solution. Use the spreadsheet to check each one for feasibility and, if feasible, for the value of the objective function. Which feasible guess has the best objective function value?

E* *d.* Use the Solver to find an optimal solution.

e. Express the model in algebraic form.

E*4.7. Consider the following algebraic formulation of a resource-allocation problem with three resources, where the decisions to be made are the levels of three activities (A_1, A_2, and A_3).

$$\text{Maximize} \quad \text{Profit} = 20A_1 + 40A_2 + 30A_3$$

subject to

$$\text{Resource 1:} \quad 3A_1 + 5A_2 + 4A_3 \leq 400 \quad \text{(amount available)}$$

$$\text{Resource 2:} \quad A_1 + A_2 + A_3 \leq 100 \quad \text{(amount available)}$$

$$\text{Resource 3:} \quad A_1 + 3A_2 + 2A_3 \leq 200 \quad \text{(amount available)}$$

and

$$A_1 \geq 0 \qquad A_2 \geq 0 \qquad A_3 \geq 0$$

Formulate and solve the spreadsheet model for this problem.

4.8. Consider a cost–benefit–trade-off problem having the following data:

4.8
a, b, c, d.

	Benefit Contribution per Unit of Each Activity		
Benefit	**1**	**2**	**Minimum Acceptable Level**
1	5	3	60
2	2	2	30
3	7	9	126
Unit cost	$60	$50	