

Page 259. Do problems 2 and 4. In each case build a model of the problem but don't solve the problem.

Remember to write the ranges of your variables. Don't write  $a \geq 0$  if you mean  $a \in \mathbb{N}$ .

2(3). A chair manufacturer makes three different types of chairs, each of which must go through sanding, staining, and varnishing. In addition, the model with the vinyl-covered back and seat must go through an upholstering process. The following table gives the time required for each operation on each type of chair, the available time for each operation in hours per month, and the profit per chair for each model. How many chairs of each type should be made to maximize the total profit?

	Sanding hours	Staining hours	Varnishing hours	Upholstering hours	Profits \$
A - solid back and seat	1	0.5	0.7	0	10
B - ladder back, solid seat	1.2	0.5	0.7	0	13
C - vinyl back and seat	0.7	0.3	0.3	0.7	8
Total time available per month	600	300	300	140	

Variables: Let  $a, b, c$  = the number of solid back, ladder back and vinyl back chairs.

Let  $P$  = the total profit.

Let  $s, t, v, u$  be the constraints for sanding, staining, varnishing and upholstering.

Objective:

Constraints:

4(3). A variety of cans of soft drinks must be selected for a party. The costs per can are: **c**ola = 69¢, **r**oot beer = 59¢, **c**herry = 62¢, **l**emon = 62¢, **o**range = 65¢, **g**rape = 55¢, ginger **a**le = 65¢. At least 12 cans must be selected. At least two must be ginger ale; at least two must be cola. No more than three cans of fruit-flavored drinks should be selected. How many cans of each type should be selected to minimize the total cost?

Before giving the objective function and constraints, state what your variables stand for.

Variables:

Objective:

Constraints:

A(3). There are  $n$  students  $s_1, \dots, s_n$  and  $n$  tutors  $t_1, \dots, t_n$ . Suppose  $p_{ij}$  = the amount of progress student  $s_i$  makes when he works with tutor  $t_j$ . Build a model for deciding which students should work with which tutors so that the total amount of progress  $P$  is max.