

7A And You Thought Chapter 6 Was Complicated...

1. A grower specialising in cut flowers is considering cultivating four varieties of new 'Sunlip' flowers A, B, C and D in one of his fields. He estimates the time, in hours per hectare, taken for each of four stages – sowing, thinning, picking and packing for each variety.

For variety A sowing, thinning, picking and packing will take 3, 18, 20 and 24 hours per hectare respectively.

For variety B sowing, thinning, picking and packing will take 4, 17, 25 and 27 hours per hectare respectively.

For variety C sowing, thinning, picking and packing will take 3, 19, 26 and 28 hours per hectare respectively.

For variety D sowing, thinning, picking and packing will take 5, 16, 22 and 23 hours per hectare respectively.

For this crop he can devote up to 70 hours to sowing, 360 to thinning, 500 to picking and 550 to packing.

He estimates the total profit, in pounds per hectare, as 67, 63, 71 and 75 for varieties A, B, C and D respectively.

He has up to 20 hectares to use for this crop and wishes to maximise his profit.

Formulate this as a linear programming problem. Define your variables, state your objective and write your constraints as inequalities.

2. In order to supplement his diet Andy wishes to take some Vitatab, Weldo, Xtramin and Yestivit tablets. Amongst other ingredients, the contents of vitamins A, B, C and iron, in milligrams per tablet, are shown in the table.

	A	B	C	Iron
Vitatab	10	10	20	4
Weldo	15	20	10	5
Xtramin	25	15	15	3
Yestivit	20	15	20	2

Andy wishes to take tablets to provide him with at least 80, 30, 60 and 14 milligrams of vitamins A, B, C and iron per day.

Because of other factors Andy wants at least 25% of the tablets he takes to be Vitatab and wants to take at least twice as many Weldo as Yestivit.

The costs of the tablets are 4, 6, 12 and 7 pence per tablet. Andy wishes to minimise the cost.

Formulate this as a linear programming problem, defining your variables, stating your objective and writing your constraints as inequalities.

Slack variables:

3. Rewrite the inequality

As an equation, using the slack variable, .

4. Rewrite the constraints for Example 1 as equations using slack variables and