

## Using the computer to solve LP Problems

There are many industrial software packages available for solving LP problems, some comfortably able to handle hundreds of thousands of variables and constraints. For our much more modest needs, some free software is available.

For LP problems with 2–7 variables and 2–7 constraints, see the web-site <http://www-fp.mcs.anl.gov/otc/Guide/CaseStudies/simplex/index.html> and click on the link “simplex tool”. This has a nice interface which solves such problems.

For larger problems, software called `lp_solve` has been installed on our system. To solve the LP problem (from class) with the furniture company making tables and chairs, namely

$$\begin{aligned} \text{maximize} \quad & 45x_1 + 80x_2 \\ \text{subject to} \quad & 5x_1 + 20x_2 \leq 400 \\ & 10x_1 + 15x_2 \leq 450 \\ & x_1, x_2 \geq 0 \end{aligned}$$

create a file (say, “furniture”) with the commands

```
45 x1 + 80 x2;
```

```
5 x1 + 20 x2 < 400;
```

```
10 x1 + 15 x2 < 450;
```

Now if you execute the command

```
lp_solve < furniture > out
```

the LP problem will be solved and the output of the program will go to the file “out”. Of course, if you want the output to go to the screen, exclude the part “>out”. If you wish to use “greater than or equal to”, simply use “>”. If you have equality constraints, use the “=” symbol. In the first line, “max” may be replaced with “min”. You may specify some of your variables to be integers; type

```
int x1,x2
```

to specify `x1` and `x2` to be integers.