

## Brief Introduction to Lindo

A Lindo source file is a text file which can be produced either with a text editor such as Notepad (and opened with “Open” in the File menu) or produced with Lindo’s own editor. Here is a simple example of such a file.

```
MIN      50 BR + 20 IC + 30 COLA + 80 PC
SUBJECT TO
          400 BR + 200 IC + 150 COLA + 500 PC >=   500
          3 BR + 2 IC >=   6
          2 BR + 2 IC + 4 COLA + 4 PC >=   10
          2 BR + 4 IC + COLA + 5 PC >=   8
END
```

First comes “MIN” for a minimization problem or “MAX” for maximization, and the objective. Then comes “SUBJECT TO”, the constraints, and finally “END”. Some points to note:

- Upper and lower case letters are interchangeable.
- The variables may be given any names (as long as they are not Lindo commands such as “MIN”).
- Inequalities can be indicated with  $\geq$  or  $\leq$ .  $>$  and  $<$  are also allowed, as synonyms for  $\geq$  and  $\leq$  respectively.
- A multiplication sign is not needed between a coefficient and a variable.
- In the constraints, all variables must be on the left side and the constant term must be on the right. Thus  $x + 3 \leq y$  should be written as  $x - y \leq -3$ .
- A parenthesized expression such as  $3(x + y)$  is not allowed: it must be expanded out as  $3 x + 3 y$ .
- Coefficients must be integers or decimals, not fractions. So  $x/2$  should be written as  $0.5 x$ .
- All variables are automatically assumed to be  $\geq 0$ . These restrictions do not need to be written out.

- Constraints may be given names, e.g.

$$C2) 3 \text{ BR} + 2 \text{ IC} \geq 6$$

would give this constraint the name C2.

When the problem file is ready, choose “Solve” in the Solve menu. For now we won’t need the “Range Analysis”. The output looks like this:

```

LP OPTIMUM FOUND AT STEP      2

      OBJECTIVE FUNCTION VALUE

    1)      90.00000

VARIABLE          VALUE          REDUCED COST
   BR              0.000000          27.500000
   IC              3.000000           0.000000
  COLA             1.000000           0.000000
   PC              0.000000          50.000000

      ROW  SLACK OR SURPLUS      DUAL PRICES
    2)           250.000000           0.000000
    3)            0.000000          -2.500000
    4)            0.000000          -7.500000
    5)            5.000000           0.000000

NO. ITERATIONS=      2

```

Here Lindo is showing you the optimal solution it found. Under “VALUE” are the values of the original variables, and under “SLACK OR SURPLUS” are the values of the slack variables. Constraints that were not named are referred to as rows 2, 3, . . . (row 1 being the objective). Later we will see the significance of the “Reduced cost” and “Dual prices”.