Solving an LP using Microsoft Excel

We will solve the following LP using Excel:

$$\text{Max } 300x_1 + 500x_2 + 400x_3$$

subject to

$$3x_1 + 4x_2 + 4x_3 \leq 80$$
$$2x_1 + 3x_2 + 2x_3 \leq 50$$
$$x_1, x_2, x_3 \geq 0$$

Steps used in solving the above using Excel:

- Select 3 cells to be x1, x2 and x3, repectively. In this example, we have chosen the cells to be B4, C4 and D4, respectively. *Note that the cells with the entries x1, x2 and x3 are simply there to remind the user that the cells adjacent to them contain the actual values of these variables.*
- Select a cell to contain the objective. In this example, that cell is B6. Here enter the following: =300*B4+500*C4+400*D4, in accordance to the objective in the LP above. *Always use an "=" to enter an equation into a cell*.
- There are two constraints in this example, in addition to the non-negativity constraints on the variables. Select two cells to contain the **left-hand sides** (LHSs) of each of these constraints: in this example, these cells are B8 and B9. To illustrate this, let us consider cell B8, it contains =4*B4+4*C4+4*D4, which is the LHS of the first constraint above.
- Now we are ready to use the built program called "Solver" within Excel.
- In the "Data" tab, click on "Solver" in "Analysis" toolbox. This should pop up a small window. Using this window, we will tell Solver where the variables, constraints and objectives are located in the Spreadsheet.
- Target cell is the cell that will eventually contain the optimal value of the objective. Therefore, click on B6 (recall that it contains our objective function) so that the "Set Target Cell" contains B6.
- Make sure that the "Equal to" is chosen appropriately, either as a Max or Min. For this example, Max should be enabled.
- Go to "By Changing Cells" and click on B4, C4 and D4. This tells Solver that B4, C4 and D4 contain the variables in the LP.
- Click on the "Add" button to add the objectives. To enter constraint number 1, for example, click on "Add", then click on B8 under "Cell Reference," choose ">=," and then type in "80" under constraint. Enter all the constraints this way.
- The non-negativity constraints can be entered as regular constraints, or one can simply go under "Options" and check "Assume Non-Negative."
- **It is important to go to Options and check "Assume Linear Model" to solve an LP.**
- Now, click on "Solve" and Solver will solve the LP.
- Highlight all the reports "Answer, Sensitivity and Limits" and make sure that the "Keep Solver Solution" is turned on and then click OK.