Part of Session 4 assignments

LINDO Implementation of Wilson Problem

The mathematical model for the Wilson Problem

Maximize 7X1+10X2 (objective function)

Subject to:
X1 ≤ By default LINDO assumes 500 (production limit of baseballs)
X2 ≤ 500 (production limit of softballs)
5X1+6X2 ≤ 3600 (Material (Cowhide) limits)
X1+2X2 ≤ 960 (time limits on production)
X1, X2 ≥ 0 (Non-negativity)

LINDO Input:

```
Max    7X1+10X2

S.T. X1 < 500
X2 < 500
5X1+6X2 < 3600
X1+2X2   < 960

END
```

Notices:

1. By default LINDO assumes the non-negativity conditions (therefore there no need to enter them).

2. By default LINDO knows that inequalities are closed type, that is (≤) should be entered as (< =) or simply <. Similarly for any (≥) constraints.

When you as for the solution, LINDO ask if you are interested in "Sensitivity Range?), if you choose yes, the following will be the output. You may Block the output and Copy it then Paste and to a WORD file for managerial analysis.

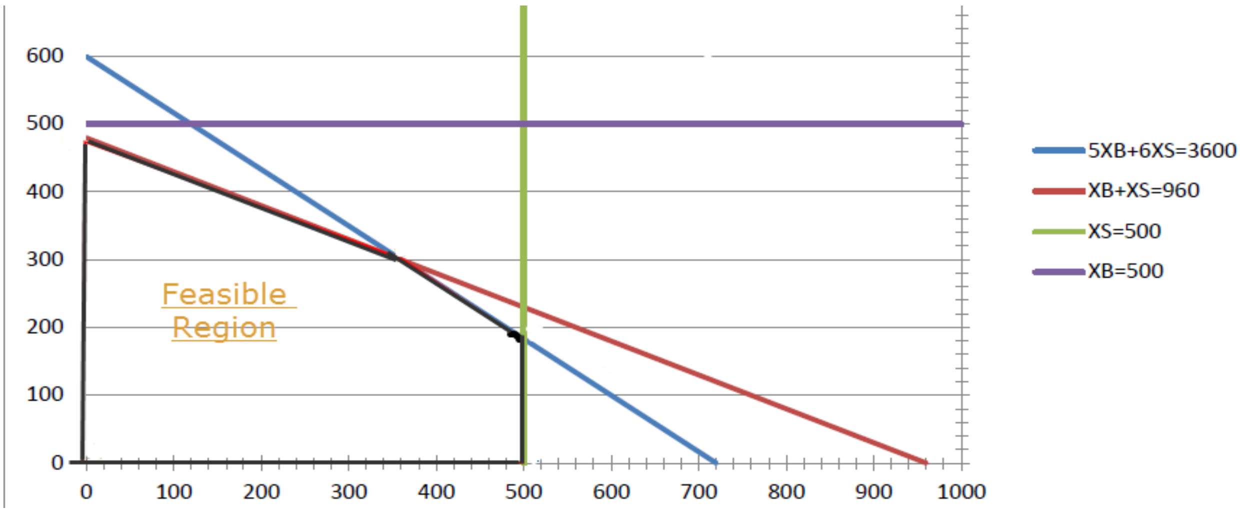
At this stage of out learning, we recognize the Optimal Solution of (X1=360, X2= 300) with Optimal of $5520.   This information agrees with your last Graphical Solution.

We will interpret all other elements in its print out, for the Manager soon after the Midterm-Exam.

Solution from LINDO:

```
LP OPTIMUM FOUND AT STEP      2

       OBJECTIVE FUNCTION VALUE

       1)      5520.000

 VARIABLE        VALUE          REDUCED COST
       X1       360.000000          0.000000
       X2       300.000000          0.000000


      ROW   SLACK OR SURPLUS     DUAL PRICES
       2)       140.000000          0.000000
       3)       200.000000          0.000000
       4)         0.000000          1.000000
       5)         0.000000          2.000000

NO. ITERATIONS=       2

RANGES IN WHICH THE BASIS IS UNCHANGED:

                          OBJ COEFFICIENT RANGES
VARIABLE        CURRENT        ALLOWABLE        ALLOWABLE
                  COEF          INCREASE         DECREASE
      X1        7.000000        1.333333         2.000000
      X2       10.000000        4.000000         1.600000

                          RIGHTHAND SIDE RANGES
     ROW        CURRENT        ALLOWABLE        ALLOWABLE
                  RHS           INCREASE         DECREASE
       2      500.000000        INFINITY       140.000000
       3      500.000000        INFINITY       200.000000
       4     3600.000000      280.000000       720.000000
       5      960.000000      160.000000        93.333336
```

Graph:



Coordinates of feasible region:

Point	x	y
A	0	0
B	0	480
C	360	300
D	500	183
E	500	0

Optimal Solution to the Wilson problem: For Wilson to maximize the daily profit they should produce 360 dozens of baseballs and 300 dozen of softballs for a daily profit maximum of $5520