MDSC-LAB-TEST -103

Roll number-23902

Wilson Problem: Wilson Manufacturing produces both baseballs and softballs, which it wholesales to vendors around the country. Its facilities permit the manufacture of a maximum of 500 dozen baseballs and a maximum of 500 dozen softballs each day. The cowhide covers for each ball are cut from the same processed cowhide sheets. Each dozen baseballs require five square feet of cowhide (including waste), whereas, one dozen softballs require six square feet of cowhide (including waste). Wilson has 3600 square feet of cowhide sheets available each day.
Production of baseballs and softballs includes making the inside core, cutting and sewing the cover, and packaging. It takes about one minute to manufacture a dozen baseballs and two minutes to manufacture a dozen softballs. A total of 960 minutes is available for production daily.
The prices for a dozen baseball and a dozen softball are 7 and 10 dollars respectively.
Answer the following:

a) Formulate the problem in the Excel file and generate the sensitivity analysis.
b) Write on cost coefficient sensitivity analysis.
c) Write on Right Hand Side Sensitivity Analysis.

SOLUTION:-

a) Formulate the problem in the Excel file and generate the sensitivity analysis.

Solved in Excel

	x1	x2		sol	
z	7	10		5520	
	360	300			
c1	1	1	660	<=	1000
c2	5	6	3600	<=	3600
c3	1	2	960	<=	960

SENSITIVITY REPORT

Variable Cells

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
$B$4	x1	360	0	7	1.333333333	2
$C$4	x2	300	0	10	4	1.6

Constraints

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
$D$6	c1	660	0	1000	1E+30	340
$D$7	c2	3600	1	3600	1200	720
$D$8	c3	960	2	960	240	240

LIMITS REPORT

		Objective				
Cell	Name	Value				
$E$3	z sol	5520				

		Variable	Lower	Objective	Upper	Objective
Cell	Name	Value	Limit	Result	Limit	Result
$B$4	x1	360	0	3000	360	5520
$C$4	x2	300	0	2520	300	5520

ANSWER REPORT

Objective Cell (Max)

Cell	Name	Original Value	Final Value
$E$3	z sol	0	5520

Variable Cells

Cell	Name	Original Value	Final Value	Integer
$B$4	x1	0	360	Contin
$C$4	x2	0	300	Contin

Constraints

Cell	Name	Cell Value	Formula	Status	Slack
$D$6	c1	660	$D$6<=$F$6	Not Binding	340
$D$7	c2	3600	$D$7<=$F$7	Binding	0
$D$8	c3	960	$D$8<=$F$8	Binding	0

b) Write on cost coefficient sensitivity analysis.

The Production of baseballs is considered to be as x1

The Production of softballs is considered to be as x2

We observe the max allowable increase is 1.33$ means we can increase $7+$1.33=8.33$max and allowable decrease is $7-$2=$5which can be within the range of profit for constraint x1.

For constraint x2 max allowable increase is 4$ which means 10$+4$=14$ is possible and decrease is 1.6$ which means 10-1.6=8.4$ is the least decreasing range that can be possible for the constraint x2.

c) Write on Right Hand Side Sensitivity Analysis.

This play a major role for profit making. We understand that

1. **For Constraint 1**

Constraint at RH side the max possible increase is infinity and decrease is 340.

The Shadow price is 0.

2. **For Constraint 2**

Constraint at RH side the max possible increase is 1200 and decrease is 720.

The Shadow price is 1 which means if we increase constraint 2 by 1 unit there will be a profit.

3. **For Constraint 3**

Constraint at RH side the max possible increase is 240 and decrease is 240.

The Shadow price is 2 which means if we increase constraint 3 by 2 unit there will be a profit.