Sensitivity Analysis

Shadow Prices:

Using R:

	Shadow price	Allowable decrease	Allowable increase
Square foot1	12	1.12E+04	1.39E+04
Square Foot2	20	1.15E+04	1.25E+04
Square Foot3	60	4.80E+03	5.18E+03
Excess Capacity1	0	-1.00E+30	1.00E+30
Excess Capacity2	0	-1.00E+30	1.00E+30
Excess Capacity3	0	-1.00E+30	1.00E+30
Sales1	0	-1.00E+30	1.00E+30
Sales2	0	-1.00E+30	1.00E+30
Sales3	0	-1.00E+30	1.00E+30
Percent_P1_P2	-0.08	-2.50E+04	2.50E+04
Percent_P1_P3	0.56	-1.25E+04	1.25E+04
P1L	0	-1.00E+30	1.00E+30
P1M	0	-1.00E+30	1.00E+30
P1S	-24	-2.22E+02	1.11E+02
P2L	-40	-1.00E+02	1.00E+02
P2M	0	-1.00E+30	1.00E+30
P2S	0	-1.00E+30	1.00E+30
P3L	-360	-2.00E+01	2.50E+01
P3M	-120	-4.44E+01	6.67E+01
P3S	0	-1.00E+30	1.00E+30

Using Excel solver:

Constraints:

Cell	Name	Final Value	Shadow Price	Constraint R.H. Side	Allowable Increase	Allowable Decrease
L8	Storage1 Constraint	13000	12	13000	888.8888889	1777.777778
L9	storage2 Constraint	12000	20	12000	500	500
L10	storage3 Constraint	5000	60	5000	181.8181818	200
L11	EC1 Constraint	694.4444444	0	750	1E+30	55.55555556
L12	EC2 Constraint	833.3333333	0	900	1E+30	66.66666667
L13	EC3 Constraint	416.6666667	0	450	1E+30	33.33333333
L14	Sales1 Constraint	516.6666667	0	900	1E+30	383.3333333
L15	Sales2 Constraint	844.4444444	0	1200	1E+30	355.5555556
L16	Sales3 Constraint	583.3333333	0	750	1E+30	166.6666667

L17	Percent_P1_P2 Constraint	1.74623E-10	-0.08	0	25000	25000
L18	Percent_P1_P3 Constraint	0	0.56	0	12500	12500
L21	P1L	516.6666667	0	0	516.6666667	1E+30
L22	P1M	177.7777778	0	0	177.7777778	1E+30
L23	P1S	0	-24	0	111.1111111	0
L24	P2L	0	-40	0	100	0
L25	P2M	666.6666667	0	0	666.6666667	1E+30
L26	P2S	166.6666667	0	0	166.6666667	1E+30
L27	P3L	0	-360	0	25	0
L28	P3M	0	0	0	2.84217E-14	1E+30
L29	P3S	416.6666667	0	0	416.6666667	1E+30

Reduced Cost using Excel Solver:

Cell	Name	Final Value	Reduced Cost	Objective Coefficient	Allowable Increase	Allowable Decrease
C3	Quantity P1L	516.6666667	0	420	40	60
D3	Quantity P1M	177.7777778	0	360	60	15
E3	Quantity P1S	0	0	300	24	1E+30
F3	Quantity P2L	0	0	420	40	1E+30
G3	Quantity P2M	666.6666667	0	360	60	15
H3	Quantity P2S	166.6666667	0	300	24	48
I3	Quantity P3L	0	0	420	360	1E+30
J3	Quantity P3M	0	-120	360	120	1E+30
K3	Quantity P3S	416.6666667	0	300	1E+30	96

Reduced Cost Using R:

Decision Variables	Reduced_Cost From	Reduced_Cost To
P1L	3.60E+02	4.60E+02
P1M	3.45E+02	4.20E+02
P1S	-1.00E+30	3.24E+02
P2L	-1.00E+30	4.60E+02
P2M	3.45E+02	4.20E+02
P2S	2.52E+02	3.24E+02
P3L	-1.00E+30	7.80E+02
P3M	-1.00E+30	4.80E+02
P3S	2.04E+02	1.00E+30

Formulation for the dual of Weigelt Corporation

Decision Variables:

Y1, Y2 ,Y3, Y4, Y5, Y6, Y7, Y8, Y9, Y10 ,Y11

Objective function:

MIN W: 750 Y1 + 900 Y2 + 450 Y3 + 13000 Y4 + 12000 Y5 + 5000 Y6 + 900 Y7 + 1200 Y8 + 750 Y9

Subject to

Y1 + 20 Y4 + Y7 + 900 Y10 +450 Y11 >= 420

Y1 + 15 Y4 + Y8 + 900 Y10 +450 Y11 >= 360

Y1 + 12 Y4 + Y9 + 900 Y10 +450 Y11 >= 300

Y2 + 20 Y5 + Y7 - 750 Y10 >= 420

Y2 + 15 Y5 + Y8 - 750 Y10 >= 360

Y2 + 12 Y5 + Y9 - 750 Y10 >= 300

Y3 + 20 Y6 + Y7 - 750 Y11 >= 420

Y3 + 15 Y6 + Y8 - 750 Y11 >= 360

Y3 + 12 Y6 + Y9 - 750 Y11 >= 300

Y1, Y2, Y3, Y4, Y5, Y6, Y7, Y8, Y9 >= 0 , Y10,Y11 Unrestricted