**23901-MDSC-103-ESE**

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

**Ans:** Max z = 7x1 + 10x2

Subj: 5x1 + 6x2 <= 3600

x1 + 2x2 <= 960

X1<=500

X2<= 500

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
| obj |  | x1 | x2 |  |  |  |
|  |  | 7 | 10 |  |  |  |
| z |  | 360 | 300 | 5520 |  |  |
|  |  |  |  |  |  |  |
| c1 |  | 5 | 6 | 3600 | <= | 3600 |
| c2 |  | 1 | 2 | 960 | <= | 960 |
| c3 |  | 1 | 0 | 360 | <= | 500 |
| c4 |  | 0 | 1 | 300 | <= | 500 |
|  |  |  |  |  |  |  |

**Sensitive Report**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |
| Variable Cells | | |  |  |  |  |  |  |
|  |  |  | **Final** | **Reduced** | **Objective** | **Allowable** | **Allowable** |  |
|  | **Cell** | **Name** | **Value** | **Cost** | **Coefficient** | **Increase** | **Decrease** |  |
|  | $C$7 | z x1 | 360 | 0 | 7 | 1.333333333 | 2 |  |
|  | $D$7 | z x2 | 300 | 0 | 10 | 4 | 1.6 |  |
|  |  |  |  |  |  |  |  |  |
| Constraints | | |  |  |  |  |  |  |
|  |  |  | **Final** | **Shadow** | **Constraint** | **Allowable** | **Allowable** |  |
|  | **Cell** | **Name** | **Value** | **Price** | **R.H. Side** | **Increase** | **Decrease** |  |
|  | $E$10 | c2 | 960 | 2 | 960 | 160 | 93.33333333 |  |
|  | $E$11 | c3 | 360 | 0 | 500 | 1E+30 | 140 |  |
|  | $E$12 | c4 | 300 | 0 | 500 | 1E+30 | 200 |  |
|  | $E$9 | c1 | 3600 | 1 | 3600 | 280 | 720 |  |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |

**b) Write on cost coefficient sensitivity analysis.**

**Ans:** we can increase up to 8.334 on baseball and we can increase up to 14 on soft ball.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Variable Cells | | |  |  |  |  |  |  |
|  |  |  | **Final** | **Reduced** | **Objective** | **Allowable** | **Allowable** |  |
|  | **Cell** | **Name** | **Value** | **Cost** | **Coefficient** | **Increase** | **Decrease** |  |
|  | $C$7 | z x1 | 360 | 0 | 7 | 1.333333333 | 2 |  |
|  | $D$7 | z x2 | 300 | 0 | 10 | 4 | 1.6 |  |

**c) Write on Right Hand Side Sensitivity Analysis.**

**Ans:** In final we can see that 360 baseballs and 300 softballs can be made in a day. Total 3600 square feet of cowhide sheets are used in 960 minutes. We can increase, time up to 1120 and 3880 square feet of cowhide sheets.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Constraints | | |  |  |  |  |  |  |
|  |  |  | **Final** | **Shadow** | **Constraint** | **Allowable** | **Allowable** |  |
|  | **Cell** | **Name** | **Value** | **Price** | **R.H. Side** | **Increase** | **Decrease** |  |
|  | $E$10 | c2 | 960 | 2 | 960 | 160 | 93.33333333 |  |
|  | $E$11 | c3 | 360 | 0 | 500 | 1E+30 | 140 |  |
|  | $E$12 | c4 | 300 | 0 | 500 | 1E+30 | 200 |  |
|  | $E$9 | c1 | 3600 | 1 | 3600 | 280 | 720 |  |
|  |  |  |  |  |  |  |  |  |

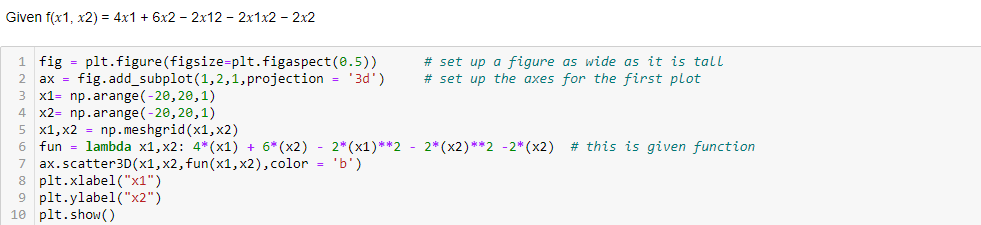
**2. Consider the following problem:**

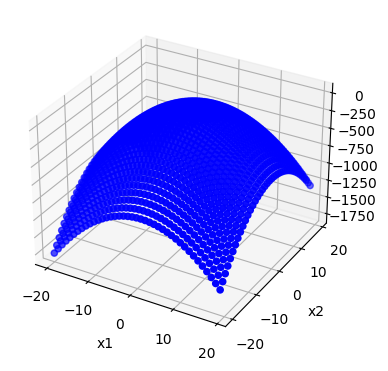
**𝑓 (𝑥1, 𝑥2) = 4𝑥1 + 6𝑥2 − 2𝑥1 2 − 2𝑥1𝑥2 − 2𝑥2 2**

**a) Write a program to visualize the above function.**

**b) Write an iterative program to maximize the function.**

**Sol:**

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