B6015 Decision Models 08/09/2000

Review Session 7

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A manufacturing company produces four model types M1, M2, M3, and M4 from parts A, B, C and D. Model M1 sells for $16,000$, model M2 for $24,000$, M3 sells for $12,000$, and model M4 for $8,000$. The numbers of the parts needed to assemble each model and the numbers of available units at the production plant for the upcoming year can be seen in the following table. The company will not be able to get any additional parts in the decision period. Furthermore, the company must produce at least 200 units of the models M1 and M2 and 100 pieces of model M4 to satisfy long-term contracts.

Part	Model M1	Model M2	Model M3	Model M4	available units
A	3	1	–	1	1,200
B	5	2	2	3	3,000
C	1	1	4	3	1,800
D	6	4	2	3	4,000

Assembly matrix

1. Formulate an appropriate LP model to maximize revenue.
2. The company is worried that solving this model may result in a fractional solution. Is that concern valid or not?
3. Solve the model using the Excel Solver and get a sensitivity report for your solution.
4. Due to a technical improvement the company could increase the market value of model M3 to $16,000$. The production of the improved model would cause an annual upgrade fee of $500,000$. Decide if that option is beneficial to the manufacturer or if we have to resolve the model.
5. (Disregard prior changes) The manufacturer has the option to purchase 400 additional parts C for $2,000$ a piece. Can the manufacturer increase profits by purchasing these additional parts?
6. (Disregard prior changes) The company has the option to get a tax cut of $5,000$ per additional model M4 that it produces. Should the manufacturer take that option?