IF824 - Otimização
Estudo de sensibilidade

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Os trabalhos são realizados na ferramenta GLPK[1].

7-1 As a result of a recent decision to stop production of toy guns that look too real, the Super Slayer Toy Company is planning to focus its production on two futuristic models: beta zappers and freeze phasers. Beta zappers produce $2.50 in profit for the company, and freeze phasers, $1.60. The company is contracted to sell 10 thousand beta zappers and 15 thousand freeze phasers in the next month, but all that are produced can be sold. Production of either model involves three crucial steps: extrusion, trimming, and assembly. Beta zappers use 5 hours of extrusion time per thousand units, 1 hour of trimming time, and 12 hours of assembly. Corresponding values per thousand units of freeze phasers are 9, 2, and 15. There are 320 hours of extrusion time, 300 hours of trimming time, and 480 hours of assembly time available over the next month.

(a) Descrição do problema

- Is the optimal solution sensitive to the exact value of the trimming hours available? At what number of hours capacity would it become relevant?
- How much should Super Slayer be willing to pay for an additional hour of extrusion time? For an additional hour of assembly time?
- What would be the profit effect of increasing assembly capacity to 580 hours? To 680 hours?
- What would be the profit effect of increasing the profit margin on beta zappers by $1500 per thousand? What would be the effect of a decrease in that amount?
- Suppose that the model of Exercise 7-1 ignores packaging capacity because it is hard to estimate, even though each thousand beta zappers requires 2 hours of packaging, and each thousand freeze phasers requires 3 hours. At what capacity would packaging affect the current optimal solution?
- Suppose that Super Slayer also has a ninja nailer model it could manufacture that requires 2 hours of extrusion, 4 hours of trimming, and 3 hours of assembly per thousand units? At what profit per thousand would it be economic to produce?

(b) Questões do estudo de sensibilidade

1. Modele o problema descrito na figura 1a como um problema de programação linear.
2. Escreve o problema na forma padrão.
3. Existe uma solução inicial obvia? Se não, qual problema de otimização podemos resolver para calcular uma solução inicial?
4. Implemente e resolva este problema com GLPK. Qual solução inicial obtemos?
5. Implemente e resolva o problema inicial. Qual solução obtemos?

[1] GNU Linear Programming t

6. Escreve o dual do problema. Resolve o problema dual com as informações da solução do primal (variáveis na base e restrições ativas). Verifique que esta solução é a mesma que a solução do problema inicial.

Resolve de novo o problema, com as informações de sensibilidade e responda à perguntas da figura 1b.