

Computational Aspects of Optimization

Knapsack evolution

Define in GAMS a model that solves the following knapsack problem:

You can choose only one of the following knapsack:

- Knapsack A: weight capacity 300, volume capacity 1000
- Knapsack B: weight capacity 500, volume capacity 700

In the chosen knapsack, you can put a combination of the following items in order to maximize the total benefit:

<i>Item</i>	<i>Weight</i>	<i>Volume</i>	<i>Benefit</i>
1	4	20	4
2	5	19	5
3	6	18	3
4	7	17	4
5	8	16	5
6	9	15	6
7	10	14	2
8	11	13	3
9	12	12	7
10	13	11	3

You also must fulfill the following conditions:

- You have to pick at least one of the first 5 items.
- You can pick at most 2 unit of item 9.
- Item 1 and item 2 are mutually exclusive but you need at least one of them, i.e. you must pick at least one unit of either item 1 or item 2, you cannot pick none, you cannot pick both. Of the one you select, you have to pick at least 7 unit.
- Item 6 can be pick only if you pick both item 4 and item 5, but one unit of item 4 and one unit of 5 is enough to pick as much as you want of item 6.