

# Multiple Knapsack Problem

## Parameters

- $n$  = amount of items (*index*  $i$ )
- $m$  = amount of knapsack (*index*  $j$ )
- $w_i$  = weight of item  $i$  ( $\forall i = 1, \dots, n$ )
- $C_j$  = capacity of knapsack  $j$  ( $\forall j = 1, \dots, m$ )
- $v_i$  = value of item  $i$  ( $\forall i = 1, \dots, n$ )

## Variables

$$- x_{ij} = \begin{cases} 1 & \text{if the item } i \text{ is in knapsack } j; \\ 0 & \text{otherwise.} \end{cases}$$

$$\begin{aligned} \max \quad & \sum_{i=1}^n \sum_{j=1}^m v_i \cdot x_{ij} \\ \text{s.t.} \quad & \end{aligned} \tag{1}$$

$$\sum_{i=1}^n w_i \cdot x_{ij} \leq C_j \quad \forall j = 1, \dots, m \tag{2}$$

$$\sum_{i=1}^n x_{ij} \leq 1 \quad \forall j = 1, \dots, m \tag{3}$$

$$x_{ij} \in \{0, 1\} \quad \forall i = 1, \dots, n \quad \forall j = 1, \dots, m \tag{4}$$