# Multiple knapsack model formulation

Problem description: https://developers.google.com/optimization/bin/multiple_knapsack

## Definitions

s=1…S sack indices
b=1…B bin indices
MaxWeight[b], b=1…B max weights in each bin
W[s], s=1…S weights vector
V[s], s=1….S values vector

## Decision variables

$x_{s,b} = \{0, 1\}$: Whether sack “s” gets selected in bin “b”

## Derived useful functions

$x_b = \sum_s v_s * x_{s,b}$: total value in bin “b”

## Objective function

$max(\sum_b x_b)$

## Constraints

**C1: Total weight per bin should not exceed max weight**

$\forall b, \sum_s x_{s,b} * w_s \leq maxweight_b$

**C2: Each sack can be included in one bin at most**

$\forall s, \sum_b x_{s,b} \leq 1$