0/1 Knapsack

$$\text{maximize} \quad \sum_{j=1}^{n} p_j x_j \tag{1}$$

$$\text{subject to} \quad \sum_{j=1}^{n} w_j x_j \leq c, \tag{2}$$

$$x_j \in \{0,1\}, \qquad j = 1, ..., n. \tag{3}$$

where

p_j	value of jth tx
x_j	jth binary variable decision
w_j	weight of jth tx
c	maximum capacity
n	number of items

Precedence Constraint Knapsack Problem (PCKP)

$$\text{maximize} \quad \sum_{j=1}^{n} p_j x_j \tag{4}$$

$$\text{subject to} \quad \sum_{j=1}^{n} w_j x_j \leq c, \tag{5}$$

$$x_i \geq x_j, \qquad (i,j) \in E, \tag{6}$$

$$x_j \in 0, 1, \qquad j = 1, ..., n. \tag{7}$$

where

p_j	value of jth tx
x_j	jth binary variable decision
x_i	ith binary variable decision
w_j	weight of jth tx
c	maximum capacity
n	number of items
G	directed, acyclic graph $G(V, E)$
E	edge in graph $G(V, E)$
V	node in graph $G(V, E)$, $V = \{1, ..., n\}$