

0-1 Knapsack

Profit = [1, 2, 5, 6]

Weight = [2, 3, 4, 5]

M = 8

0 — not choosing
1 — choosing the object

[0/1 0/1 0/1 0/1]

$\Theta(2^n) \Rightarrow$ Exponential Time complexity

Tabulation Approach

			$\omega \rightarrow$								
			0	1	2	3	4	5	6	7	8
P	ω		0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
1	2	1	0	0	1	1	1	1	1	1	1
2	3	2	0	0	1	2	2	3	3	3	3
5	4	3	0	0	1	2	5	5	6	7	7
6	5	4	0	0	1	2	5	6	6	7	8

x_1	x_2	x_3	x_4
0	1	0	1

$$8 - 6 = 2$$

$\omega \geq \omega_t(i)$ — Case (2)

Important

$$\text{Profit}(i, \omega) = \text{value}(i, \omega) =$$

$$\left\{ \begin{array}{l} \max(V(i-1, \omega), V(i-1, \omega - \omega_t(i)) + P(i)) \\ \max(5, 6) = 6 \end{array} \right.$$

$$\left\{ \frac{\omega \prec \omega_t(i) \rightarrow \text{case } \textcircled{1}}{\hookrightarrow \underline{v(i-1, \omega)}} \right.$$