



The Knapsack Problem

Algorithms: Design
and Analysis, Part II

An Example

Example ($n = 4, W = 6$)

Initialization: $A[0, x] = 0$ for all x

Main loop:

For $i = 1, \dots, n$

For $x = 0, \dots, W$

$$A[i, x] := \max\{A[i - 1, x], A[i - 1, x - w_i] + v_i\}$$

Example:

$W = 6$

$v_1 = 3, w_1 = 4$

$v_2 = 2, w_2 = 3$

$v_3 = 4, w_3 = 2$

$v_4 = 4, w_4 = 3$

6	0	3	3	7	8
5	0	3	3	6	8
4	0	3	3	4	4
3	0	0	2	4	4
2	0	0	0	4	4
1	0	0	0	0	0
$x = 0$	0	0	0	0	0
	$i = 0$	1	2	3	4

Optimal value = 8

Optimal solution =
{item 3, item 4}