

# Knapsack problem: Dynamic Programming - Solution Extration (left as Ex.)

$i$	$v_i$	$w_i$
1	\$1	1 kg
2	\$6	2 kg
3	\$18	5 kg
4	\$22	6 kg
5	\$28	7 kg

$$OPT(i, w) = \begin{cases} 0 & \text{if } i = 0 \\ OPT(i - 1, w) & \text{if } w_i > w \\ \max \{OPT(i - 1, w), v_i + OPT(i - 1, w - w_i)\} & \text{otherwise} \end{cases}$$

		weight limit w											
		0	1	2	3	4	5	6	7	8	9	10	11
subset of items 1, ..., i	{ }	0	0	0	0	0	0	0	0	0	0	0	0
	{ 1 }	0	1	1	1	1	1	1	1	1	1	1	1
	{ 1, 2 }	0	1	6	7	7	7	7	7	7	7	7	7
	{ 1, 2, 3 }	0	1	6	7	7	18	19	24	25	25	25	25
	{ 1, 2, 3, 4 }	0	1	6	7	7	18	22	24	28	29	29	40
	{ 1, 2, 3, 4, 5 }	0	1	6	7	7	18	22	28	29	34	35	40

$OPT(i, w)$  = max-profit subset of items 1, ..., i with weight limit w.