Mini Homework 5

1. The recursion formula: $M_{i,w} = \begin{cases} 0 \text{ if } i = 0 \text{ or } w = 0 \\ M_{i-1,w} \text{ if } nw_i > w \text{ for } 1 \leq n \leq n_i \\ \max_{0 \leq n \leq n_i} nv_i + M_{i-1,w-nw_i} \text{ otherwise} \end{cases}$

i \ w	0	1	2	3	4	5	6	7	8
1	0	0	0	6	6	6	12	12	12
2	0	0	0	6	6	6	12	12	12
3	0	1	2	6	7	8	12	13	14
4	0	1	4	6	8	10	12	14	16

2. Backtracking from $M_{i,w}$ until $w = 0$:

   - If $M_{i,w} = M_{i-1,w}$, then goes to $M_{i-1,w}$.

   - Else for $n = 1, 2, \ldots, n_i$:

     - If $M_{i,w} = nv_i + M_{i-1,w-nw_i}$, then take n items, goes to $M_{i-1,w-nw_i}$ and break.

   The graphical representation of backtracking is as follows (each number denotes the step):

i \ w	0	1	2	3	4	5	6	7	8	Remark
1	4						3			Take 2 items
2							2			
3							1			
4									0	Take 1 item