

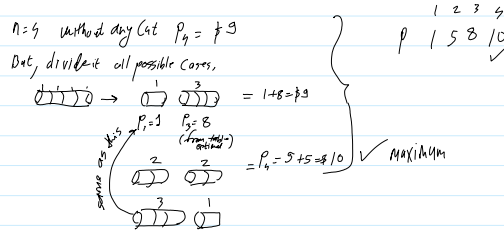
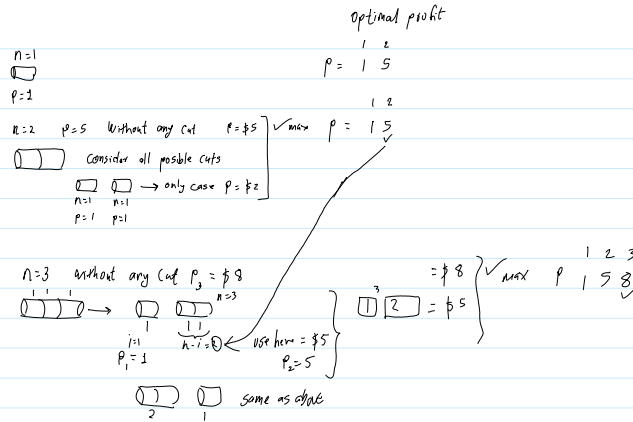
# Dynamic Programming

Thursday, January 5, 2017 1:42 AM

## Rod Cutting Problem

Length l	1	2	3	4	5	6	7	8	9	10
Price p <sub>l</sub>	1	5	8	9	10	17	17	20	24	30

- For each length n we will consider its direct value without any cut from given table V<sub>i</sub>
- And that that length n,
  - We will decompose that n into all parts from 1 to n.
  - Get its value of decomposition addition.
- Compare these two values for each decomposition with Original value from table without any cut.
- Store maximum one for that length n. We stored optimal here and use it for next length n.



Generalize the problem,

$$\text{Profit}_{\text{length } n} = \max \left( \text{Profit without any cut OR } \text{length } n-1 + \text{length } n-1 \text{ OR } \text{length } n-2 + \text{length } n-2 \text{ OR } \dots \text{length } n-1 + \text{length } n-1 \right)$$

Let's say ↑ has max profit  
 So we update optimal decomposition for length n with this profit

for loop from length = n-1 to n  
 for i = 1 to i = n-i (remaining)

$$\text{Profit}_n = \max \left( p_n, p_1 + p_{n-1}, p_2 + p_{n-2}, p_3 + p_{n-3}, \dots, p_{n-1} + p_1 \right)$$