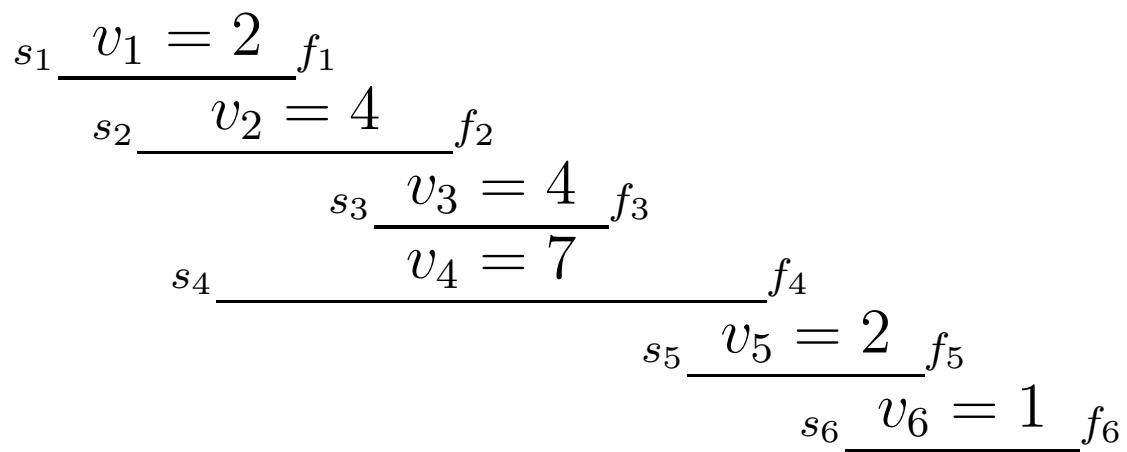


Weighted Interval Scheduling



Either $s_6 \underline{v_6} f_6$ is selected, or it is not.

Weighted Interval Scheduling

- There is a set of intervals not overlapping with $s_6 \text{---} v_6 \text{---} f_6$. Call the set $P(6)$.
- If $s_6 \text{---} v_6 \text{---} f_6$ is selected, we get v_6 and must do optimally on $P(6)$. Write this as $v_6 + M[P(6)]$.
- If not selected, $M[5]$.
- $M[n]$ is the optimal *VALUE*.

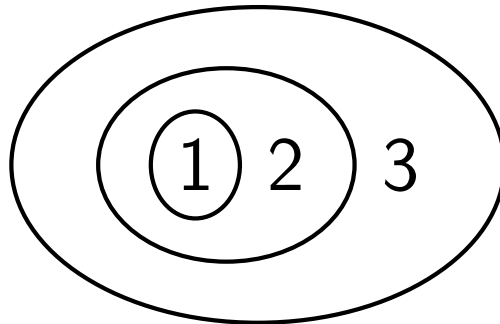
Weighted Interval Scheduling

- $M[0] = 0$
 $M[1] = v_1$
 $M[2] = \max \begin{cases} v_2 + M[P(2)] \\ M[1] \end{cases}$
 $M[3] = \max \begin{cases} v_3 + M[P(3)] \\ M[2] \end{cases}$
- Use the *VALUE* of sub-solutions (NOT the sub-solution itself) to get larger sub-solution values.
- E.g. $F(n) = \max \begin{cases} a_n + F(n-2) \\ F(n-1) \end{cases}$

Weighted Interval Scheduling

In General:

$$\begin{aligned} \square \quad M[n] &= \max \begin{cases} v_n + M[P(n)] \\ M[n-1] \end{cases} \\ \square \quad M[j] &= \max \begin{cases} v_j + M[P(j)] \\ M[j-1] \end{cases} \end{aligned}$$



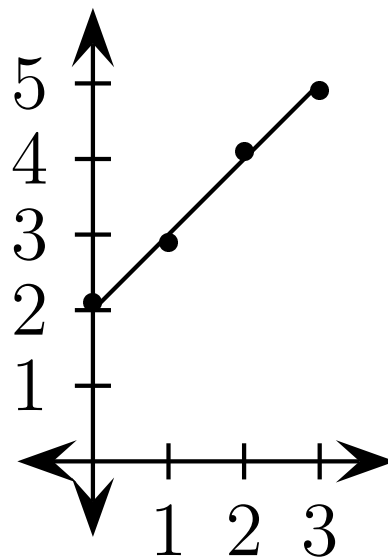
- ☐ An order or subproblems
- ☐ Sub-solution *values* not structure of subproblems



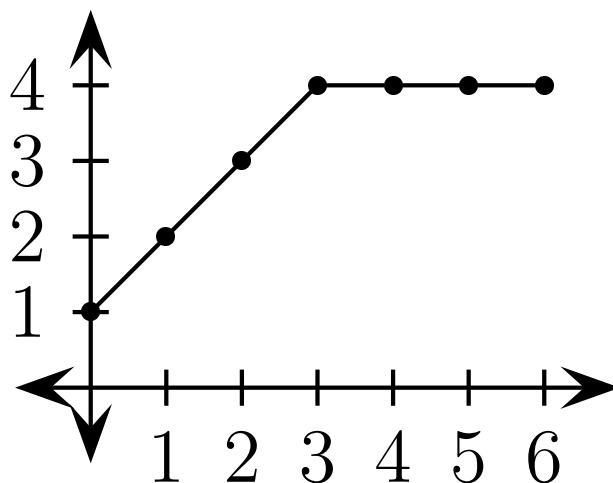
Least Squares

Given a sequence of points $p_i = (x_i, y_i)$, find a and b so that the sum of the error² is minimized in $y = b + ax$.

$$\begin{aligned} p_0 &= (0, 2.1) \\ p_1 &= (1, 2.9) \\ p_2 &= (2, 4.1) \\ p_3 &= (3, 4.9) \end{aligned}$$



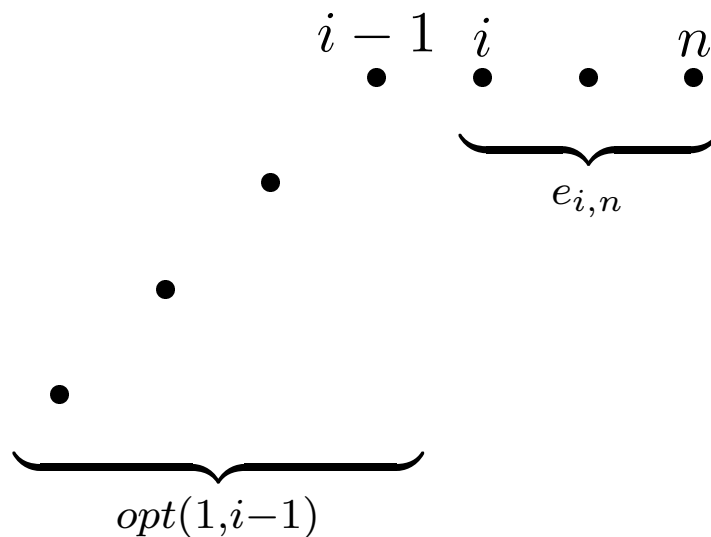
Least Squares



- Use two line-segments
- $\text{error} = \sum_{i=1}^n (y_i - ax_i - b)^2$
- Want $\text{opt}(1, n)$

Least Squares

- If we use $(n - 1)$ line segments, we have no error.
- If we change directions of line segments, each change costs, say, \$3



$$opt(1, n) = opt(1, i - 1) + c + e_{i,n}$$