Nov 4

Simplified problem: Instead of outputting an optimal solution O, output $v(O) = \sum_{j \in O} v_j$

$OPT(j)$ $\stackrel{def}{=}$ value of an optimal solution for $[j]$ $\begin{cases} (s_1, f_1, v_1) \\ \vdots \\ (s_j, f_j, v_j) \end{cases}$

$1 \le j \le n$

ASSUME: $f_1 \le f_2 \le \cdots \le f_n$

Goal: Compute $OPT(n)$

Def: O_j be an optimal solution for $[j]$

$v(O_j) = OPT(j)$

Case 1: $j \in O_j$ Claim 1: $O_j \setminus \{j\}$ is an optimal solution for $[p(j)]$

Def: $p(j)$ = smallest value i s.t. i & j do not conflict

= 0 if no such i $\exists$

$\Rightarrow OPT(j) = v_j + OPT(p(j))$ — (1)

Case 2: $j \notin O_j$ Claim 2: O_j is an optimal solution for $[j-1]$

$\Rightarrow OPT(j) = OPT(j-1)$ — (2)

Combined (1) & (2)

$OPT(j) = \max\{OPT(j-1), v_j + OPT(p(j))\}$

$p(6) = 2$