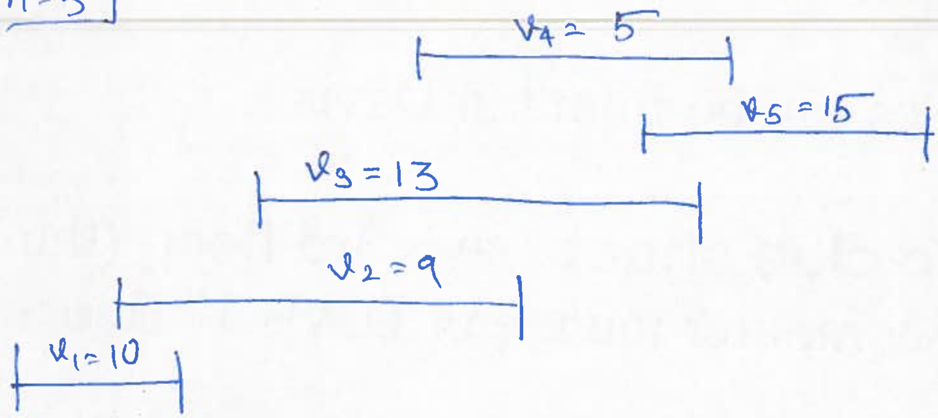
Nov 17

Ex. $p(j)$ values can be computed in $O(n\log n)$ ti[me]

Bonus Ex: Can you do $O(n)$?

$$M[j] = \max\{v_j + M[p(j)], M[j-1]\} \qquad M[0] = [0]$$

Example: $\boxed{n=5}$



~~p(5)~~ $p(4) = $

$p(5) = 2$

$p(3) = 1$

$p(2) = 0$

$p(1) = 0$

	0	1	2	3	4	5
$j=0$	0					
$j=1$	0	10				
$j=2$	0	10	10			
$j=3$	0	10	10	23		
$j=4$	0	10	10	23	23	
$j=5$	0	10	10	23	23	25

$p(2)$ $2{-}1$

$M[0] = 0$

$M[1] = \max\{v_1 + M[0], M[0]\}$
$\quad = \max\{10+0, 0\} = 10$

$M[2] = \max\{v_2 + M[0], M[1]\}$
$\quad = \max\{9+0, 10\} = 10$

$M[3] = \max\{v_3 + M[1], M[2]\}$
$\quad = \max\{13+10, 10\} = 23$

$M[4] = \max\{v_4 + M[1], M[3]\}$
$\quad = \max\{5+10, 23\} = 23$

$M[5] = \max\{v_5 + M[2], M[4]\}$
$\quad = \max\{15+10, 23\} = 25$

Compute an optimal schedule: $5 \overset{?}{\in} O_5$ As $15+10 > 23$

$\Rightarrow 5 \in O_5$

Now consider $O_5 \setminus \{5\} = O_2 \subseteq [2]$ $\quad 2 \overset{?}{\in} O_2$ As $9+0 < 10$

$\Rightarrow 2 \notin O_2$

Now consider $O_1 =$ ~~[illegible]~~ $O_2 \Rightarrow 1 \overset{?}{\in} O_1$ As $10+0 > 0 \Rightarrow 1 \in O_1$

$\Rightarrow$ ~~f~~ optimal schedule $= \{1, 5\}$

```
M-schedule (n, M, p)
    If n==0   return φ
    If v_n + M[p(n)] > M[n-1]
        return {n} ∪ M-schedule (p(n), M, p)
    else
        return M-schedule (n-1, M, p)
```