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$\boxed{6.6}$

$((bbbba)(c))$ $\rightarrow$ $(((((bb)b)b)b)a)c)$

b

b

b

c

c.

Split based on the final multiplication

$(s_1 s_2 \ldots s_j)(s_{j+1} \ldots s_n) = a$

$a = a.c = b.c = c.a$

$\forall\, i, j : \quad s_i \ldots s_j,\ a/b/c \quad DP[i,j,x]$ yes/no.

$\forall\, a, b, c.$

$1 \le j < n$

$DP[1, n, a] = \text{yes}$ iff $(DP[1, j, a] = \text{yes}) \wedge (DP[j+1, n, c] = \text{yes})$

① $\quad a \quad\quad c$

② $\quad$ " $\quad b \quad\quad a \quad\quad c$

③ $\quad$ " $\quad c \quad\quad a \quad\quad a$

vary j

$3 . n^2$

$\Theta(n)$ per entry.

$\Theta(n^3)$.

$\boxed{6.7}$

$X[1 \ldots n]$.

$X[i \ldots j] \leftarrow$ biggest palindromic subsequence

Call it $\boxed{DP(i, j)}$

final answer : $DP[1, n]$.

base case must be given

$DP[i, j]$

i	$i+1$	- - - -	$j-1$	j

x

$O(n^2)$.

$O(1)$

i included, j not included : $DP[\cancel{\ }, i, j-1]$.

j not included, i included : $DP[i+1, j]$.

both included : $X[i] = X[j] \to DP(i+1, j-1) + 2$.

both excluded $X[i] \neq X[j] \Rightarrow DP(i+1, j-1)$

Max

- parameterization
- base case
- find answer
- recursive step
- time complexity.

6.10

- $DP[i, k]$ = k heads in the coin $p_1, \ldots, p_i$

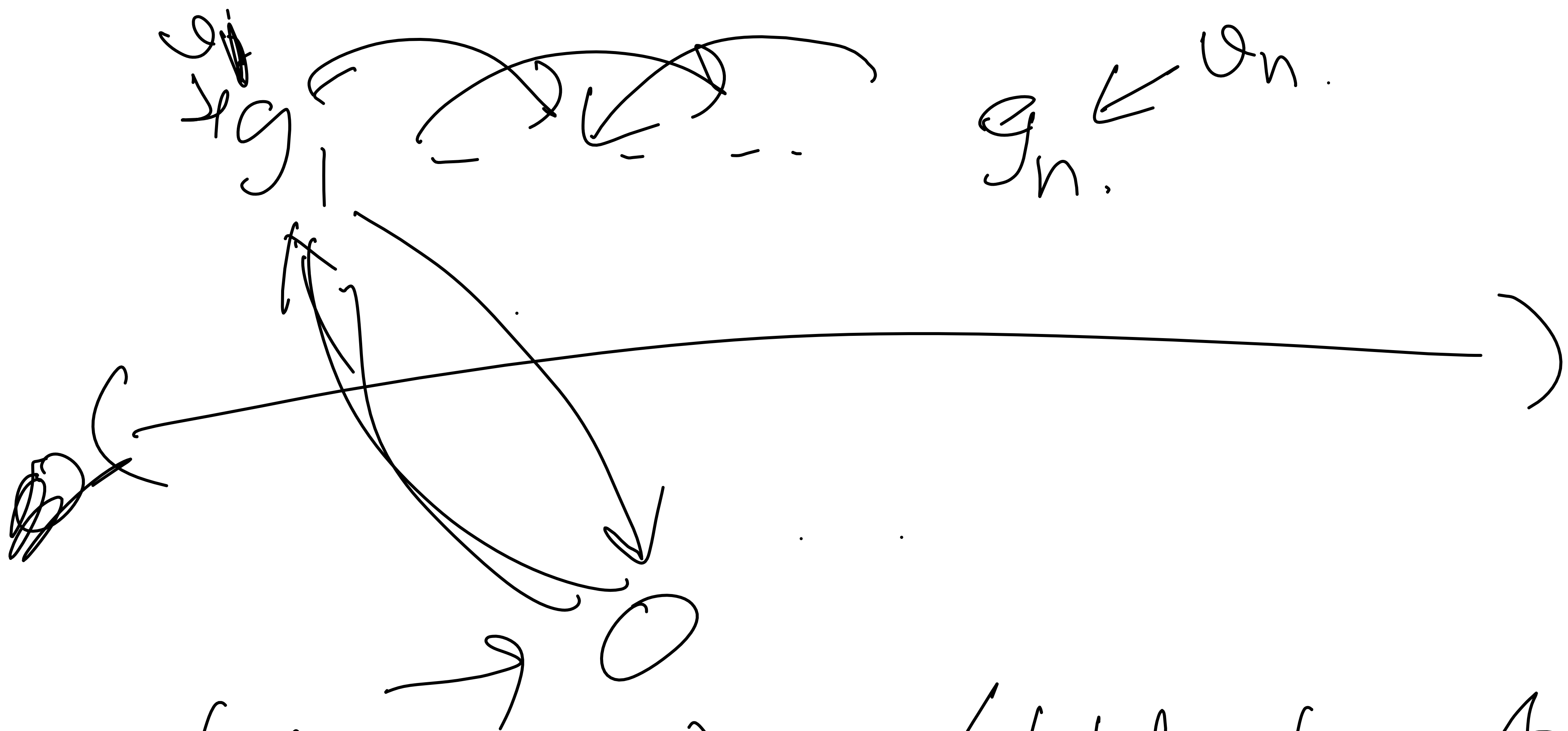
- $DP[n, k]$ ← final answer.

- $DP[j, t] = p_j \cdot DP[j-1, t-1] + (1-p_j)\, DP[j-1, t]$.

n, k,

$O(nk)$.

6.16 :



Max : (total profit) − (total transportation).

$$\sum_{i=1}^{n} g_i \quad - \quad (d_{01} + g_{12} + g_{23} + \cdots + g_{n-1,n} + d_{n0})$$

- g_i the first garage
- g_j is the last garage.

parameterize the subset of garages I'll be visiting:

2^n many!

$g_1 \cdots g_i \cdots \cdots g_j \cdots g_n$

$g_1 \cdots g_{i-1}\, g_{i+1} \cdots g_n$, first options at the best tour which is subset of this

~~best~~ tour

g_j

d_{ij}

$(n-1)$ many.

~~Cost of~~ best tour in $g_1, \dots, g_n$ where first garage is g_i & the last one is g_k

$$= \min \left(d_{0i} + \left(\text{first go from } g_i \text{ to } g_j \right) \to d_{ij} + \text{cost of best tour in } \{g_1 \dots g_n\} \setminus g_i \text{ where first garage is } g_j \text{ \& last garage is } g_k + d_{k0} \right)$$

vary g_j

now take & min.

n options here.

$(n, 2^n, n) \to O(n^3 2^n)$.

6.20

$\underbrace{p_1, \ldots, p_n}, j$

~~$[1, n, j]$~~

$s \in \{1 \ldots n\}$

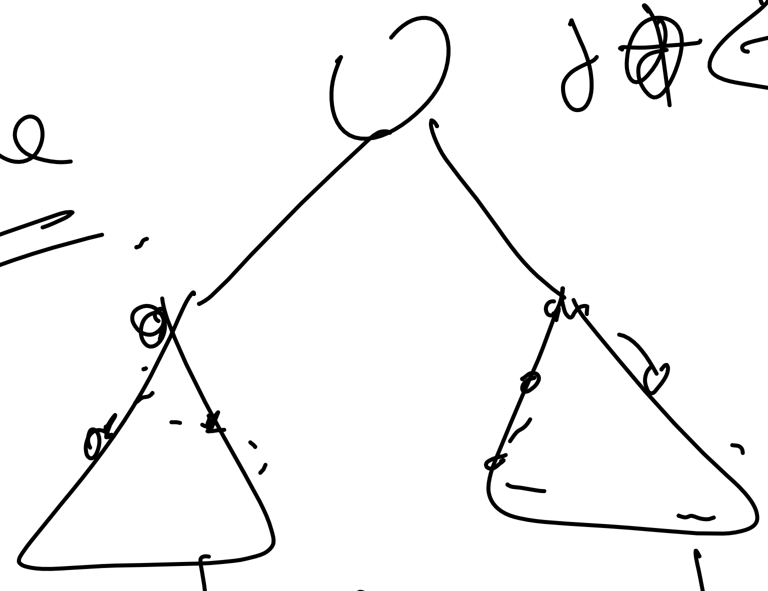
$t \in \{1, \ldots n\}$ ~~$j \in \{t, \ldots j\}$~~

$DP[s, t, \cancel{j}]$ → vary j take min

$p_s, p_{s+1}, \ldots, p_t$

cost of best BST on p_s — p_t where my root is p_j

j ←



~~$\Sigma(p_s \ldots p_t)$~~

$\Sigma p(j-1, \ldots k)$ $\Sigma(p_{j+1}, \ldots t)$

j $\left\{ \begin{array}{l} DP[s, j-1, \cancel{k}] \\ DP[\cancel{s}\, j+1, t, \cancel{k}] \end{array} \right.$ min over j

$O(n^3)$ time