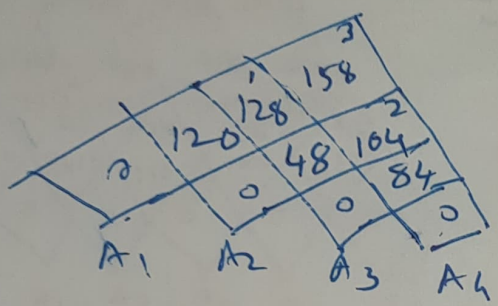
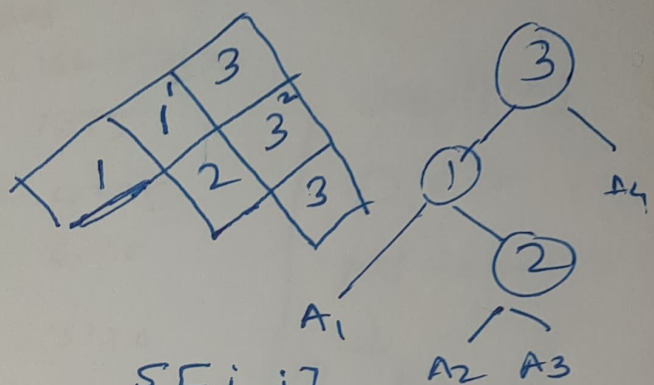
MCM – soln-order

initial set of dimensions ⟨5 4 6 2 7⟩

A_1	A_2	A_3	A_4
5×4	4×6	6×2	2×7



m[i,j]



s[i,j]

① $(A_1)(A_2A_3)$ (5×4, 4×2) $= 40 + 48$

$(A_1A_2)(A_3)$ (5×6, 6×2) $= 60 + 120$

② $A_2(A_3A_4)$ (4×6, 6×7) $= 168 + 84$

$(A_2A_3)A_4$ (4×2, 2×7) $= 56 + 48$

③ $A_1(A_2A_3A_4)$ (5×4, 4×7) $= 140 + 104 = 244$

$(A_1A_2)(A_3A_4)$ (5×6, 6×7) $= 120 + 84 + 240$

~~$A_1(A_2A_3)A_4$~~ (5×4, 4×2, 2×7) $= 48 + 40 + 70 = 158$

$(A_1A_2A_3)A_4$ (5×2, 2×7) $= 70 + 128$

order $(A_1(A_2A_3))A_4$

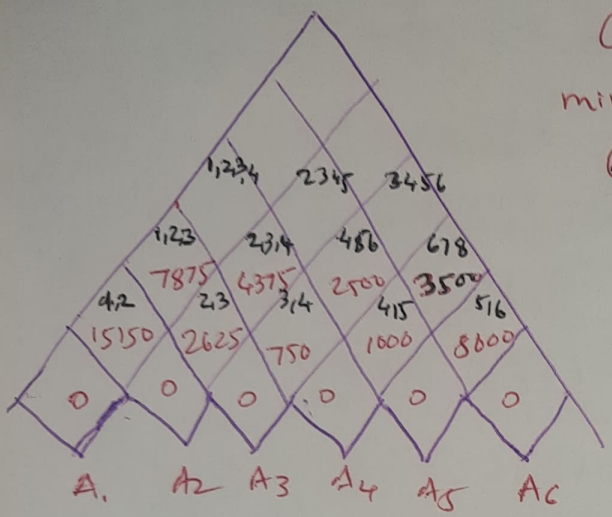
```
n ← length[p] - 1
for i = 1 to n
    do m[i,j] = 0
for L = 2 to n do
    (L is length of subchain)
    for i = 1 to n - L + 1
        do j = i + L - 1
        m[i,j] = ∞
        for k = i to j - 1
            do
q ← m[i,k] + m[k+1,j]
        + p_{i-1} p_k p_j
        if q < m[i,j]
        then
            m[i,j] ← q
            s[i,j] ← k
return m, s
```

mcm-2

PLEDGE
Patni's Learning Edge

matrix chain multiplication

A_1	A_2	A_3	A_4	A_5	A_6
30×35	35×15	15×5	5×10	10×20	20×25



① $(A_1 A_2) A_3$ = ~~7875~~

min

② $A_1 (A_2 A_3)$ = ~~4375~~ 7875

$(30 \times 35 \times 5) + 2625$ = 5250 + 2625

= 7875

③ $(A_2 A_3) A_4$ = 4375

$A_2 (A_3 A_4)$ = 6000

④ $(A_3 A_4) A_5$ = 3750

$A_3 (A_4 A_5)$ = 2500

⑤ $(A_4 A_5) A_6$ = 3500

$A_4 (A_5 A_6)$ = 5750

35 × 150 = 5250

applying DP to NP-class → ↓ formulations may not be efficient as no. of subprbs is large (should be poly. number)

Dyna. – subsmatrix table smaller bottom up comput.

	D & C	Dyna	D & C	Greedy
divide subproblems	y	y		n
independent subprb. (subprb share sub-sub prb)	~~n~~	y		n
guarantee optimal soln	y	y		n.
Choose & test at current step				y