

Review 8-5

1. The minimum number of scalar multiplications for computing $A_i A_{i+1} \dots A_j$, denoted by $m[i, j]$, is as follows. Fill in the blank.

$$m[i, j] = \begin{cases} 0 & \text{if } i = j \\ \boxed{} & \text{if } i < j \end{cases}$$

2. Compute (a) $m[2, 5]$ and (b) $s[2, 5]$ in the following example and parenthesize (c) the product $A_1 A_2 A_3 A_4 A_5 A_6$ fully to minimize the number of scalar multiplications.

m	1	2	3	4	5	6
1	0	15750	7875	9375	11875	15125
2		0	2625	4375	(a)	10500
3			0	750	2500	5375
4				0	1000	3500
5					0	5000
6						0

s	2	3	4	5	6
1	1	1	3	3	3
2		2	3	(b)	3
3			3	3	3
4				4	5
5					5
6					

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

$$(a) \ m[2, 5] = \min \left\{ \begin{array}{l} \end{array} \right.$$

$$(b) \ s[2, 5] =$$

$$(c) \ A_1 \ A_2 \ A_3 \ A_4 \ A_5 \ A_6$$

3. Fill in the blanks in the following pseudocode for MATRIX-CHAIN-ORDER.

MATRIX-CHAIN-ORDER (p)

$n = p.length - 1$

let $m[1..n, 1..n]$ and $s[1..n-1, 2..n]$ be new tables

for $i = 1$ **to** n

$m[i, i] = 0$

for $l = 2$ **to** n // l is the chain length

for

$j = i + l - 1$

$m[i, j] = \infty$

for $k = i$ **to** $j - 1$

if $q < m[i, j]$

return m and s

4. Fill in the blanks in the following pseudocode for PRINT-OPTIMAL-PARENS.

PRINT-OPTIMAL-PARENS (s, i, j)

if

print " A_i "

else print "("

PRINT-OPTIMAL-PARENS ($s, i, s[i, j]$)

print ")"