Question 4-

Using matrix-chain, the given number are

$<10, 9, 6, 7, 16, 13>$

Let's $A_1 < 10 \times 9 >$

$A_2 < 9 \times 6 >$

$A_3 < 6 \times 7 >$

$A_4 < 7 \times 16 >$

$A_5 < 16 \times 13 >$

	1	2	3	4	5
1	0	540	960	1050	3940
2		0	378	1386	2622
3			0	672	1920
4				0	1456
5					0

	1	2	3	4	5
1	0	1	2	3	2
2	0	0	2	3	2
3	0	0	0	3	4
4	0	0	0	0	4
5	0	0	0	0	0

$M[1,2] = 10 \times 9 \times 6 = 540$

$M[2,3] = 9 \times 6 \times 7 = 378$

$M[3,4] = 6 \times 7 \times 16 = 672$

$M[4,5] = 7 \times 16 \times 13 = 1456$

$M[1,3] = M[1,1] + M[2,3] + M[10 \times 9 \times 7]$

or

$M[1,2] + M[3,3] + [10 \times 6 \times 7]$

$= 0 + 378 + 630$ or $540 + 0 + 420$

$= 1008 > 960$

$M[1,3] = 960$

$M[2,4] = M[2,2] + M[3,4] + [2 \times 6 \times 16]$

(or)

$M[2,3] + M[4,4] + [9 \times 7 \times 16]$

$= 0 + 672 + 864$ or $378 + 0 + 1008$

$= 1536 > 1386$

$= 1386$

$M[3,5] = M[3,3] + M[4,5] + (6 \times 7 \times 13]$

or

$M[3,4] + M[5,5] + [6 \times 16 \times 13]$

$= 0 + 1456 + 546$ or $672 + 0 + 1248$

$= 2002 > 1920$

$M[3,5] = 1920$

$M[1,4] = \text{Min}\{ M[1,1] + M[2,4] + (16 \times 9 \times 16),$

$M[1,2] + M[3,4] + (10 \times 6 \times 16]$

$M[1,3] + M[4,4] + (10 \times 7 \times 16)\}$

$= \min\{2896, 2172, 2080\}$

$M[1,4] = 2080$

$M[2,5] = \min\{ M[2,2] + M[3,5] + (1 \times 6 \times 13)$

$M[2,3] + M[4,5] + (9 \times 7 \times 13)$

$M[2,4] + M[4,4] + (9 \times 16 \times 13)\}$

$= \min\{ 0, 1920 + 702,$
$3781\ 1456 + 819,$
$1386 + 0 + 1872\}.$

$M[2,5] = \min\{2622; 2653; 3258\}$

$M[2,5] = 2622$ //

$M[1,5] = \min\{ M[1,1] + M[2,5] + (10 \times 9 \times 13)$
$M[1,2] + M[3,5] + (10 \times 6 \times 13),$

$M[1,3] + M[4,5] + (10 \times 7 \times 13)$
$M[1,4] + M[5,5] + (10 \times 16 \times 13)\}$

$= \min\{ 0 + 2622 + 1170,$
$540 + 1920 + 780,$
$960 + 1456 + 910,$
$2080 + 0 + 2080\}$
$= \min\{3792, 3240 + 3326 + 4160\}$

$M[1,5] = 3240.$

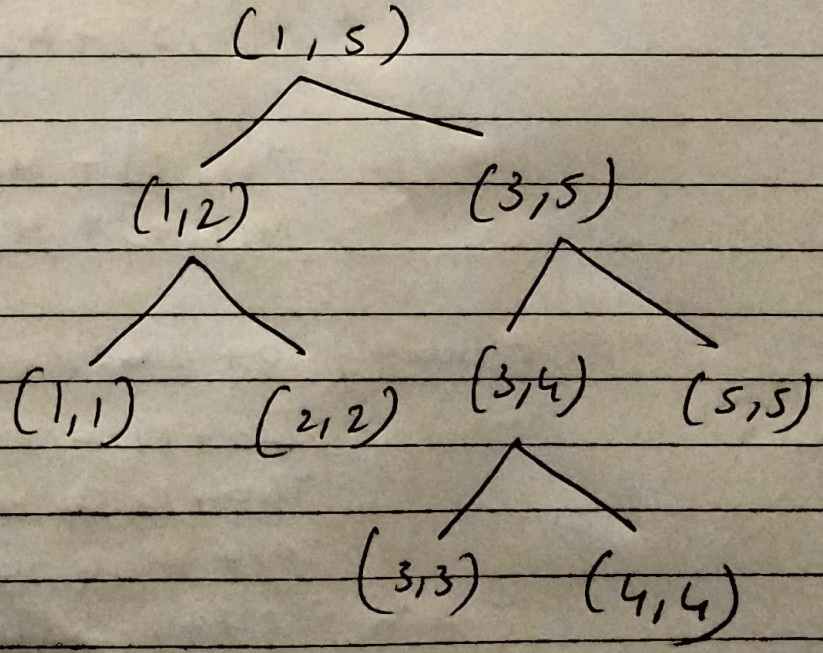
Table-1

	540	960	2080	3240
		378	1386	2622
			672	1920
				1450

split table

0	1	2	3	2
0	0	2	3	2
0	0	0	3	4
0	0	0	0	4
0	0	0	0	0

Tree for optimal parenthesization.



∴ Multiplication sequence is $(A1 * A2)((A3 * A4) * A5))$