## Matrix chain multiplication: A and B can be multiplied when number of row in B= number of column in A

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \end{bmatrix} \underbrace{a_{21}}_{A_{21}} \underbrace{b_{21}}_{b_{21}} \underbrace{b_{22}}_{b_{31}} \underbrace{b_{32}}_{3x_{2}} \underbrace{b_{31}}_{3x_{2}} \underbrace{b_{32}}_{3x_{2}} \underbrace{b_{31}}_{3x_{2}} \underbrace{b_{31}}_{3x_{2}} \underbrace{b_{32}}_{3x_{2}} \underbrace{b_{31}}_{a_{11}} \underbrace{b_{12} + a_{12} b_{22} + a_{13} b_{32}}_{2x_{2}} \underbrace{a_{21} b_{11} + a_{22} b_{21} + a_{23} b_{31}}_{2x_{2}} \underbrace{a_{21} b_{12} + a_{22} b_{22} + a_{23} b_{32}}_{2x_{2}} \underbrace{a_{22} b_{22} + a_{23} b_{22} + a_{23} b_{22}}_{2x_{2}} \underbrace{a_{22} b_{22} + a_{23} b_{22}}_{2x_{2}} \underbrace{a_{22} b_{22} + a$$

$$A_1 = 2 \times 3$$
  $A_2 = 3 \times 4$   $A_3 = 4 \times 2$ .  
Ninimum multiplication to find A1A2A3.

$$A_1 = 2 \times 3$$
  $A_2 = 3 \times 4$   $A_3 = 4 \times 2$ .  
Minimum multipliation to find A1A2A3.

$$(A1.A2) \cdot A3$$
 $A_1 \cdot (A_2 \cdot A_3)$ 

Dimensions  $2 \times 3 \times 4 \cdot 4 \times 2$ 
 $Cost$ 
 $Cost$ 

$$A_1 = 2 \times 3$$
  $A_2 = 3 \times 4$   $A_3 = 4 \times 2$ .  
Minimum multiplication to find A1A2A3.

Dimensions 
$$(A_1 A_2) \cdot A_3$$
 $2 \times 3 \cdot 3 \times 4 \cdot 4 \times 2$ 

Cost =  $2 \times 4 \times 2 = 16$ 

Told cost operations =  $40$ 

A1 (A2 · A3).

A1 · (A2 · A3)

Dimensions 
$$4 \times 3$$
  $3 \times 4 \cdot 4 \times 2$ ,

 $3 \times 4 \times 2 = 24$ 

Dimensions

 $3 \times 2$ 
 $0 \times 4 = 2 \times 3 \times 2 = 12$ 

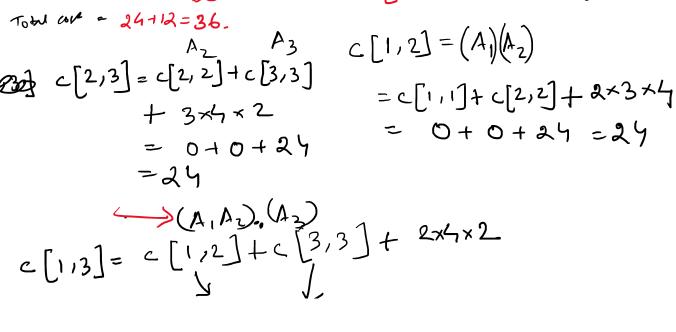
· Tobal and  $= 24 + 12 = 36$ .

A2 A3

C[2,3] =  $c[2,2] + c[3,3]$ 
 $+ 3 \times 4 \times 2$ 
 $= 0 + 0 + 24$ 
 $= 24$ 

A3 =  $4 \times 2$ .

(A, A2), (A2)



	1	2_	3	
	0	24	36	
2		0	24	
3			0	

$$A_1)(A_2\cdot A_3)$$

$$A_3$$

$$A_4$$

$$A_4$$

$$A_{1}A_{2}A_{3}A_{4}$$
 $(A_{1}A_{2})(A_{3}A_{4})$ 
 $A_{1}(A_{2}A_{3}A_{4})$ 
 $A_{2}(A_{3}A_{4})(A_{2}A_{3})A_{4}$ 

A, Az A3

[211] W2A,