

(cont)
Right Side: $[C, [A, B]] ; [A, B] = (AB - BA)$

$$[A, B] = \begin{bmatrix} a_{11}b_{11} + a_{12}b_{21} & a_{11}b_{12} + a_{12}b_{22} \\ a_{21}b_{11} + a_{22}b_{21} & a_{21}b_{12} + a_{22}b_{22} \end{bmatrix}$$

$$[C, [A, B]] = (C[AB] - [AB]C)$$

$$\textcircled{3} = \begin{bmatrix} c_{11}(a_{11}b_{11} + a_{12}b_{21}) + c_{12}(a_{21}b_{11} + a_{22}b_{21}) & c_{11}(a_{11}b_{12} + a_{12}b_{22}) + c_{12}(a_{21}b_{12} + a_{22}b_{22}) \\ c_{21}(a_{11}b_{11} + a_{12}b_{21}) + c_{22}(a_{21}b_{11} + a_{22}b_{21}) & c_{21}(a_{11}b_{12} + a_{12}b_{22}) + c_{22}(a_{21}b_{12} + a_{22}b_{22}) \end{bmatrix}$$

$$\textcircled{2} - \textcircled{3} = \textcircled{1}$$

$$\textcircled{2} - \textcircled{3} \rightarrow \textcircled{2}: \begin{bmatrix} a_{11}b_{11}c_{11} + a_{12}b_{11}c_{21} + a_{21}b_{12}c_{11} + a_{22}b_{12}c_{21} & a_{11}b_{12}c_{12} + a_{12}b_{12}c_{22} + a_{21}b_{22}c_{12} + a_{22}b_{22}c_{22} \\ a_{11}b_{21}c_{11} + a_{12}b_{21}c_{21} + a_{21}b_{22}c_{11} + a_{22}b_{22}c_{21} & a_{11}b_{21}c_{12} + a_{12}b_{21}c_{22} + a_{21}b_{22}c_{12} + a_{22}b_{22}c_{22} \end{bmatrix}$$

$$\textcircled{3}: \begin{bmatrix} a_{11}b_{11}c_{11} + a_{12}b_{21}c_{11} + a_{21}b_{11}c_{12} + a_{22}b_{21}c_{12} & a_{11}b_{12}c_{11} + a_{12}b_{12}c_{21} + a_{21}b_{22}c_{12} + a_{22}b_{22}c_{12} \\ a_{11}b_{11}c_{21} + a_{12}b_{11}c_{21} + a_{21}b_{12}c_{21} + a_{22}b_{12}c_{21} & a_{11}b_{12}c_{21} + a_{12}b_{12}c_{22} + a_{21}b_{22}c_{22} + a_{22}b_{22}c_{22} \end{bmatrix}$$

11