91강 보충강의

$$[x_1 \ x_2] \begin{bmatrix} a_1 & a_3 \\ a_3 & a_2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = [a_1 x_1^2 + a_2 x_2^2 + 2a_3 x_1 x_2]_{1\times1}$$

$$[x_1 \ x_2 \ x_3] \begin{bmatrix} a_1 & a_4 & a_5 \\ a_4 & a_2 & a_6 \\ a_5 & a_6 & a_3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

$$[x_1 \ x_2] \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = a_{11}x_1^2 + a_{22}x_2^2 + a_{12}x_1x_2 + a_{21}x_1x_2$$
$$+ 2a_{12}x_1x_2$$

↳ 대칭행렬

★ $$[x_1 \ x_2 \cdots x_n] \begin{bmatrix} a_{11} & a_{12} & a_{13} & \cdots & a_{1n} \\ a_{21} & a_{22} & a_{23} & \cdots & a_{2n} \\ \vdots & & & & \vdots \\ a_{n1} & a_{n2} & a_{n3} & \cdots & a_{nn} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} = a_{ij}x_j x_i \ (i, j \in \{1 \sim n\})$$

pf) $$[x_1 \ x_2 \cdots x_n]_{1\times n} \begin{bmatrix} a_{11} & a_{12} & a_{13} & \cdots & a_{1n} \\ a_{21} & a_{22} & a_{23} & \cdots & a_{2n} \\ \vdots & & & & \\ a_{n1} & a_{n2} & a_{n3} & \cdots & a_{nn} \end{bmatrix}_{n\times n} = \left[\sum_{i=1}^{n} x_i a_{i1} \ \ \sum_{i=1}^{n} x_i a_{i2} \cdots \sum_{i=1}^{n} x_n a_{in} \right]$$

$$\left[\sum_{i=1}^{n} x_i a_{i1} \ \ \sum_{i=1}^{n} x_i a_{i2} \cdots \sum_{i=1}^{n} x_n a_{in} \right]_{1\times n} \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix}_{n\times 1} = \begin{bmatrix} \quad\quad \end{bmatrix}_{1\times1}$$

$$= x_1 \sum_{i=1}^{n} x_i a_{i1} + x_2 \cdot \sum_{i=1}^{n} x_i a_{i2} + \cdots + x_n \cdot \sum_{i=1}^{n} x_i a_{in} \quad /$$

$$a_{i1} x_1 x_i$$