$$(AB)^{T} = A^{T}A^{T}$$

$$(ab)^{e} f$$

For Scolars 'S'
$$S = S^{T}$$

4

Scalar (s).

Vector
$$\Theta = \begin{bmatrix} \Theta_1 \\ \Theta_2 \\ \Theta N \end{bmatrix}$$

$$\frac{26}{36} = \frac{26}{36}$$

Derivative of a scalar wir.t. vector 0

$$\frac{\partial A \partial}{\partial \theta} \quad \text{who } A \partial \quad \text{is a scalar}$$

$$\frac{\partial A \partial}{\partial \theta} \quad \text{olive a vector}$$

$$A = \begin{bmatrix} A \\ A \end{bmatrix} \quad A = \begin{bmatrix} A \\$$

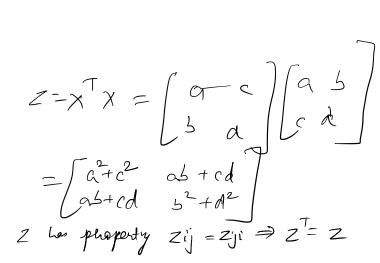
$$\begin{array}{c} (0) \quad \underline{\partial} \quad (0) \quad \underline{\partial}$$

0 20 is a Scalar 0 is vector 2 is of the form ctc

$$x = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$$

$$x = \begin{bmatrix} \alpha & b \\ c & d \end{bmatrix}$$

$$x^{7} = \begin{bmatrix} \alpha & c \\ b & a \end{bmatrix}$$



$$= \begin{bmatrix} c^2 + c^2 & ab + cd \\ ab + cd & b^2 + a^2 \end{bmatrix}$$

$$= \begin{bmatrix} ab + cd & b^2 + a^2 \\ 2 & \text{phaperty} & zij = zji \Rightarrow z^{-1} = z \end{bmatrix}$$

$$2 = \begin{bmatrix} a & b \\ b & c \end{bmatrix}$$

$$0 = \begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$$

$$0 = \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix}$$

$$0 = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$0 = \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix}$$

- $0^{7}20 = \begin{bmatrix} 0_{1} & 0_{2} \end{bmatrix} \begin{bmatrix} a_{1} & b_{2} \\ 3 & c \end{bmatrix} \begin{bmatrix} 0_{1} \\ 0_{2} \end{bmatrix}$

- $= \begin{bmatrix} \theta_1 & \theta_2 \end{bmatrix} \begin{bmatrix} \alpha \theta_1 + \beta \theta_2 \\ \beta \theta_1 + c \theta_2 \end{bmatrix} = \alpha \theta_1^2 + \beta \theta_1 \theta_2 + \beta \theta_1 \theta_2 \\ + c \theta_2^2 \\ + c \theta_2^2 \end{bmatrix}$ $\frac{\partial}{\partial \theta} \begin{bmatrix} \alpha \theta_1^2 + 2 \theta_1 \theta_2 + c \theta_2 \end{bmatrix} = \begin{bmatrix} \frac{\partial}{\partial \theta_1} \left(\alpha \theta_1^2 + 2 \theta_1 \theta_2 + c \theta_2^2 \right) \\ \frac{\partial}{\partial \theta_2} \left(\alpha \theta_1^2 + 2 \theta_1 \theta_2 + c \theta_2^2 \right) \end{bmatrix}$

$$= \begin{bmatrix} 2_{\alpha} \theta_{1} + 23\theta_{2} \\ 23\theta_{2} + 2c\theta_{2} \end{bmatrix} = 2 \begin{bmatrix} \alpha \\ \beta \end{bmatrix} \begin{bmatrix} \theta_{1} \\ \theta_{2} \end{bmatrix}$$

$$\frac{\partial}{\partial \theta} \left(\theta^{\mathsf{T}} Z \theta \right) = 2 Z \theta = 2 Z^{\mathsf{T}} \theta$$