$$\vec{x} \longmapsto \vec{y} = \vec{y}(\vec{x}) \qquad d\vec{x} \to d\vec{y} = \underline{\vec{y}(\vec{x})}\, d\vec{x} \qquad \left[\left(\frac{\partial}{\partial \vec{x}}\right)\vec{y}\,\cdot\right] d\vec{x}$$

行列

$$y_1 = y_1(x_1, x_2) \qquad dy_1 = \frac{\partial y_1}{\partial x_1}dx_1 + \frac{\partial y_1}{\partial x_2}dx_2$$

$$y_2 = y_2(x_1, x_2) \qquad dy_2 = \frac{\partial y_2}{\partial x_1}dx_1 + \frac{\partial y_2}{\partial x_2}dx_2$$

$$y_3 = y_3(x_1, x_2) \qquad dy_3 = \frac{\partial y_3}{\partial x_1}dx_1 + \frac{\partial y_3}{\partial x_2}dx_2$$

$$\vec{y} = \vec{y}(\vec{x})$$

2×3

$$\left(\frac{\partial \vec{y}}{\partial \vec{x}}\vec{y}\right)d\vec{x} \qquad d\vec{y} = \begin{pmatrix} dy_1 \\ dy_2 \\ dy_3 \end{pmatrix} = \begin{pmatrix} \frac{\partial y_1}{\partial x_1} & \frac{\partial y_1}{\partial x_2} \\ \frac{\partial y_2}{\partial x_1} & \frac{\partial y_2}{\partial x_1} \\ \frac{\partial y_3}{\partial x_1} & \frac{\partial y_3}{\partial x_2} \end{pmatrix} \overset{d\vec{x}}{\begin{pmatrix} dx_1 \\ dx_2 \end{pmatrix}}$$

$$(AB)^T$$

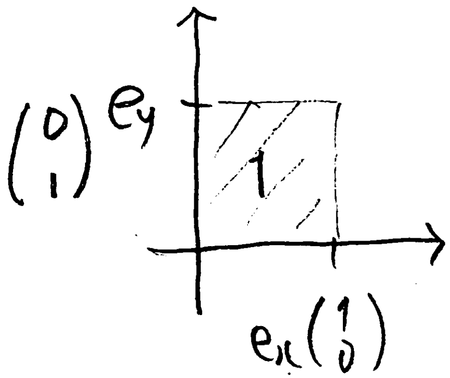
$$\left(\frac{\partial}{\partial \vec{x}}\cdot\vec{y}\right)d\vec{x}$$

$$\partial(x_1, x_2)$$

$$\overset{\vec{y}}{\begin{pmatrix} y_1 \\ y_2 \\ y_3 \end{pmatrix}}\left(\frac{\partial}{\partial x_1}, \frac{\partial}{\partial x_2}\right) = \boxed{\begin{pmatrix} \frac{\partial}{\partial x_1} \\ \frac{\partial}{\partial x_2} \end{pmatrix}(y_1, y_2, y_3)}^T$$

$$(y_1, y_2, y_3)^T \cdot \begin{pmatrix} \frac{\partial}{\partial x_1} \\ \frac{\partial}{\partial x_2} \end{pmatrix}^T$$

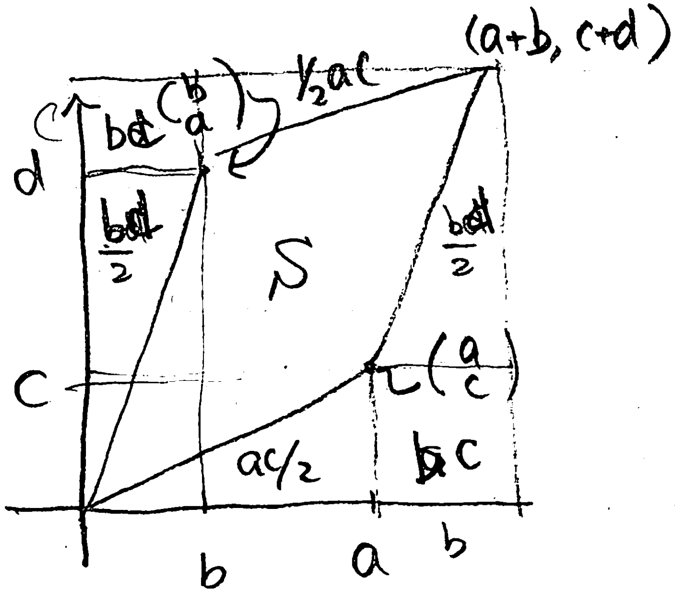
$$\begin{pmatrix} y_1 \\ y_2 \end{pmatrix}$$



$$A = \begin{pmatrix} a & b \\ c & d \end{pmatrix} = \left(\begin{pmatrix} a \\ c \end{pmatrix} \begin{pmatrix} b \\ d \end{pmatrix} \right) \qquad \begin{matrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{matrix}$$

$$A\vec{e_x} = \begin{pmatrix} a \\ c \end{pmatrix} \qquad \begin{pmatrix} a_{11} \\ a_{21} \end{pmatrix}$$

$$A\vec{e_y} = \begin{pmatrix} b \\ d \end{pmatrix} \qquad \begin{pmatrix} a_{12} \\ a_{22} \end{pmatrix}$$



$$A \cdot \vec{x} = \alpha \underbrace{A\vec{e_x}} + \beta \underbrace{A\vec{e_y}}$$

$$= \alpha \vec{e_x}' + \beta \vec{e_y}'$$

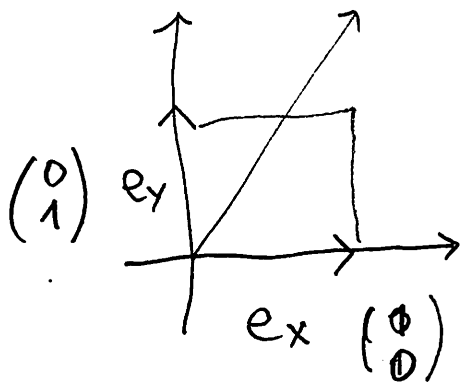
$$\vec{x} = \alpha \vec{e_x} + \beta \vec{e_y}$$

$$S = (a+b)(c+d) - 2ac - 2bd - 2bc$$

$$= \cancel{ac} + ad + bc + \cancel{bd} - ac - bd - 2bc$$

$$= ad - bc$$

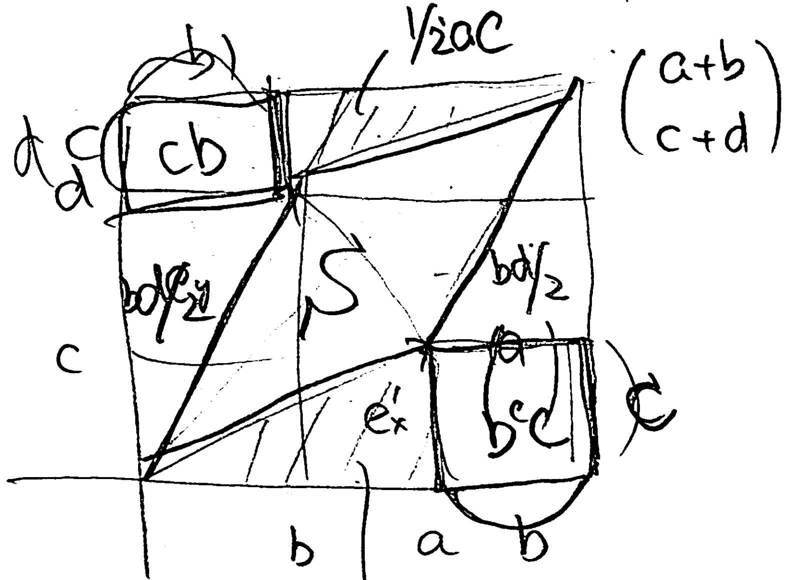
$\vec{x} = \alpha \vec{e}_x + \beta e_y$



新い線形空間の基底ベクトル面積

$$A e_x = \left(\begin{pmatrix}a\\c\end{pmatrix}\begin{pmatrix}b\\d\end{pmatrix}\right)\begin{pmatrix}1\\0\end{pmatrix} = \begin{pmatrix}a\\c\end{pmatrix}$$

$$A e_y = \text{〃} \begin{pmatrix}0\\1\end{pmatrix} = \begin{pmatrix}b\\d\end{pmatrix}$$



$ac/2 \quad bd/2$

矩形のS

$(a+b)\cdot(c+d) - ac - bd$

$-bd - ac$

$\cancel{ac} + ad + bc + \cancel{bd} - \cancel{2ac} \; \cancel{2bd}$

$\cancel{ad - bc} \quad \underline{ad - bc}$

$-ac - bd - 2bc$

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$ 単位

$$\begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix} \begin{pmatrix} 0 & 0 \\ 0 & 1 \end{pmatrix}$$ 射影

$$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$$ 交代

$$\begin{pmatrix} 0 & 1 \\ 0 & 0 \end{pmatrix} \begin{pmatrix} 0 & 0 \\ 1 & 0 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$$?

$$\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$$ 零