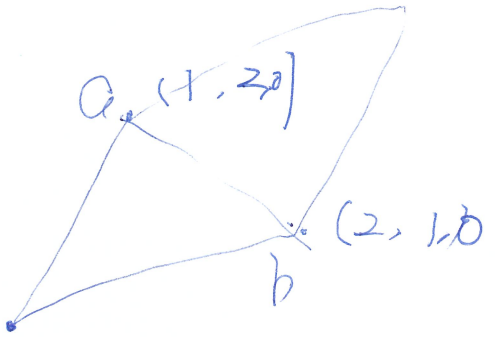

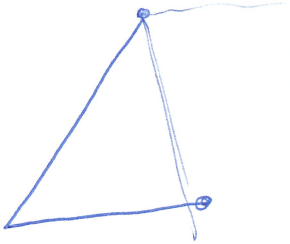

$a = (a_1, a_2, a_3)$

$b = (b_1, b_2, b_3)$

$(a_2 b_3$

自分の軸の要素がない

$$a \times b = (a_1 e_1 + a_2 e_2 + a_3 e_3)(b_1 e_1 + b_2 e_2 + b_3 e_3)$$

$$= (a_1 b_1 \underbrace{e_1 \times e_1}_{0} + a_1 b_2 \underbrace{e_1 \times e_2}_{e_3} + a_1 b_3 \underbrace{e_1 \times e_3}_{-e_2}$$

$$+ a_2 b_1 \underbrace{e_2 \times e_1}_{-e_3} + a_2 b_2 \underbrace{e_2 \times e_2}_{0} + a_2 b_3 \underbrace{e_2 \times e_3}_{e_1}$$

$$+ a_3 b_1 \underbrace{e_3 \times e_1}_{e_2} + a_3 b_2 \underbrace{e_3 \times e_2}_{-e_1} + a_3 b_3 \underbrace{e_3 \times e_3}_{0}$$

$$) = \begin{pmatrix} (a_2 b_3 - a_3 b_2)\vec{e_1} \\ (a_3 b_1 - a_1 b_3)\vec{e_2} \\ (a_1 b_2 - a_2 b_1)\vec{e_3} \end{pmatrix}$$