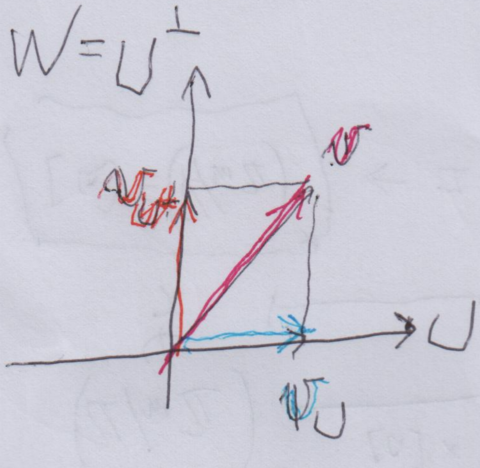
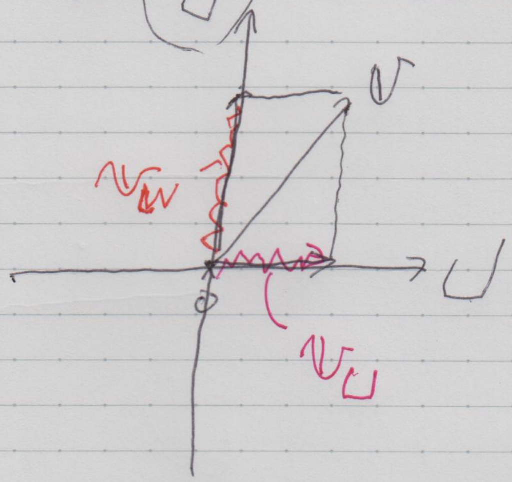


$$U \oplus W = V$$

$$v = v_U \oplus v_W$$

V : 2次元 $\qquad W = U^{\perp}$

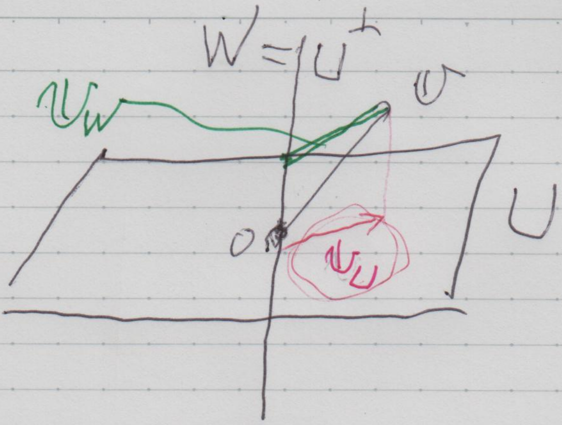


$V = U \oplus W$

$v = v_U + v_W$

No.

Date



$V = U \oplus W$

$v = v_U + v_W$

$v \overset{P_U}{\longmapsto} v_U$

V：計量ベクトル空間 $\Rightarrow$ $V \simeq (\mathbb{R}^n$, 標準内積$)$

有限次元

$v_1, \cdots, v_n$ 基底

→ 正規直交基底

$\{u_1, \cdots, u_n\}$

Vの各元は $\sum a_j u_j$ と書ける.

座標

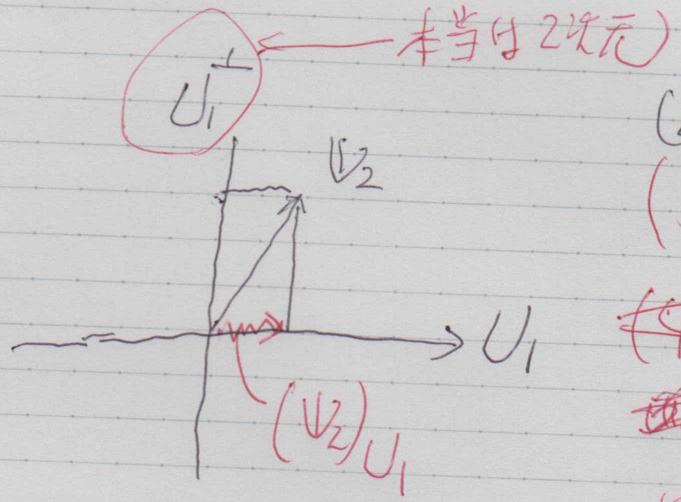
$$\left(\sum a_j u_j\right) \cdot \left(\sum b_k u_k\right) = \sum a_j b_j$$

15:40 ～

$\mathbb{v}_1 = \begin{pmatrix} 4 \\ 5 \\ 3 \end{pmatrix} \quad \|\mathbb{v}_1\| = \sqrt{4^2+5^2+3^2} = \sqrt{50} = 5\sqrt{2}$

(1) $\frac{1}{5\sqrt{2}} \mathbb{v}_1 = \mathbb{u}_1$

(2)



(2)
(3)

訂正

~~(4)~~

$\cancel{\mathbb{w}_1}$, $\mathbb{w}_2$, $\mathbb{w}_3$ を
定数倍をのぞいて
求めれば可とする.

(2) $\mathbb{w}_2 = (\mathbb{v}_2, \mathbb{u}_1)\mathbb{u}_1$

(3) $\mathbb{R}\mathbb{v}_1 + \mathbb{R}\mathbb{v}_2$ の
正規直交基底がこう求まる.
$\{\mathbb{w}_1, \mathbb{w}_2\}$

$\mathbb{w}_1 = \mathbb{u}_1$

$\mathbb{w}_2 \doteq (\mathbb{v}_2)_{U_1^{\perp}}$

$w_1 = u_1$

w_1

$w_2 = (v_2)_{u_1^\perp}$ を長さでわったもの

$u_3 = (v_3, w_1) \cdot w_1 + (v_3, w_2) \cdot w_2$

(4) 訂正

(w_1, w_2, w_3)をよこに並べる

$$\begin{pmatrix} \frac{4}{5\sqrt{2}} & & \\ \frac{5}{5\sqrt{2}} & & \\ \frac{3}{5\sqrt{2}} & & \end{pmatrix}$$

一般に

行列 $T = (w_1 \ w_2 \ w_3)$　　$w_1 = \begin{pmatrix} * \\ * \\ * \end{pmatrix}$

に対し

$${}^tT = \begin{pmatrix} {}^tw_1 \\ {}^tw_2 \\ {}^tw_3 \end{pmatrix}$$

(w_1とw_2の標準内積)

$$\shortparallel$$

$${}^tTT = \begin{pmatrix} {}^tw_1 \cdot w_1 & {}^tw_1 \cdot w_2 & {}^tw_1 w_3 \\ & & \end{pmatrix}$$