M a N jsou podpr. na l. vekt.

? dim V

$M \nparallel N$ $\quad M \cap N = \emptyset$

$\mathrm{Dir}(M) \cap \mathrm{Dir}\, N \neq \{0\}$

$\mathrm{Dir}(M) = S$, $\mathrm{Dir}\, N = T$

$S \cap T \overset{?}{=} T$ $\quad$ ~~$T \subseteq S$~~

$S \cap T \overset{?}{=} S$ $\quad$ ~~$S \subseteq T$~~

$S \cap T \subsetneq T$

$\{0\} \neq S \cap T \subsetneq S$

$\dim(S \cap T) \geq 1$

$\dim(T) \geq 2$, $\dim(S) \geq 2$

$$\dim(S+T) = \underline{\dim S + \dim T - \dim(S\cap T)}$$

$$\dim(S\cap T) < \min(\dim(S), \dim(T))$$

$$\dim(S\cap T)+1 \le \min(\dim(S), \dim(T))$$

$$- \quad \geq - \min$$

$$-$$

$$\dim(S+T) \geq \max(\dim(S), \dim(T))+1$$

$$S+T \subsetneq V \qquad \dim(V) \geq 4 \quad 3$$

$f(x) = \varphi(x) + u$ $\qquad \varphi$ LZ

$\Leftarrow \qquad u \in V \implies$

φ ij AZ $\qquad \forall \alpha \in \mathbb{K}$

$f(\alpha x_1 + (1-\alpha) x_2) \overset{?}{=} \alpha f(x_1) + (1-\alpha) f(x_2)$

$\varphi(\alpha x_1 + (1-\alpha) x_2) + u = \alpha \varphi(x_1) + (1-\alpha)\varphi(x_2)$

$+ \alpha u + (1-\alpha) u = \alpha(\underbrace{\varphi(x_1) + u}_{f(x_1)}) + (1-\alpha)(\underbrace{\varphi(x_2) + u}_{f(x_2)})$

$$\Rightarrow \quad f : V \to W \qquad \varphi \,?\, W$$

$$f = \varphi + w \qquad \underline{\underline{\varphi(0) = 0}}$$

$$f(0) = \varphi(0) + w = w$$

$$\varphi(0) = 0$$

$$\varphi = f - w$$

$$\varphi(\lambda x_1 + \mu x_2) = f(\lambda x_1 + \mu x_2 + (1-\lambda-\mu)0) - w = \lambda f(x_1) + \mu f(x_2) + (1-\lambda-\mu) w - w =$$

$$= \lambda (f(x_1) - w) + \mu (f(x_2) - w)$$

$$f = \varphi + u, \quad \psi = g - v$$

$$(f \circ g)(x) = f(\psi(x) + v) =$$

$$= \varphi(\psi(x) + v) + u =$$

$$= \varphi(\psi(x)) + \varphi(v) + u$$

$f(M) \overset{?}{=} AP$

$P_1, P_2 \in f(M)$

$M = q + S \qquad S \leq V$

$f(M) = f(q) + \varphi(S) \qquad \boxed{AP}$

VP

$f^{-1}(N) = \emptyset \qquad$ ja;

$f^{-1}(N) \neq \emptyset \qquad \exists\ q \in f^{-1}(N)$

$f(q) \in N \qquad N = f(q) + T$

$T = N - f(q)$

$f^{-1}(N) = q + \varphi^{-1}(T) \Rightarrow AP$

je UP

$$\dim V = \dim \operatorname{Ker} \varphi + \dim \operatorname{Im} \varphi$$

$$\operatorname{Im} f = \operatorname{Im} \varphi + P \qquad f = \varphi + \alpha$$

? $\dim f^{-1}(y) = \dim \operatorname{Ker} \varphi$

$\forall y \in \operatorname{Im} f \qquad y = f(x), \; x \in V$

$$x \in f^{-1}(y) \qquad \underline{f^{-1}(y)} = (x) + \frac{\varphi^{-1}(0)}{\operatorname{Ker} \varphi}$$

$f = \varphi + u$ $\qquad$ $f, g, h, \ldots$ $\qquad$ $\varphi = \psi^{n}$

$\Downarrow$

? $f^{-1} = \psi + \psi^{-1}$ $\qquad$ $\varphi, g, h, \ldots$ $\qquad$ $\mathbb{R}$: $\psi = \varphi^{-1}$

$(\psi + \psi^{-1}) \circ (\varphi + u)(x) = \psi(\varphi(x)) +$

$+ \psi(u) + \psi^{-1} = id(z) = x.$

$\psi^{-1} = -\psi(u) = -\varphi^{-1}(u)$

$$\varphi(x) = Ax$$

$$\mathrm{rk}(\varphi) = \dim(\mathrm{Im}(\varphi)) = \dim[\ldots] =$$

$$= \mathrm{rk}(A)$$

$$\varphi : K^n \to K^m$$

$$n = \dim \mathrm{Ker}\,\varphi + \dim \mathrm{Im}\,\varphi$$

$$\mathrm{Im}\,\varphi = \mathrm{rk}(A)$$

$J = \{2, 5\}$

$x_2 = 1, \quad x_5 = 0 \qquad x_1 = -2, \qquad x_3 = x_4 = 0$

$(-2, 1, 0, 0, 0)$

$x_2 = 0, \quad x_5 = 1$

$x_4 = 2, \quad x_3 = -\frac{1}{2}, \quad x_1 = \frac{1}{3}$

$(\frac{1}{3}, 0, -\frac{1}{2}, 2, 1)$

$$Ax = b$$

$$\forall\, y, r \in R(A|b) \Rightarrow y - r \in R(A)$$

$$Ay = b$$

$$Ar = b$$

$$A(y - r) = 0$$

$r \in R(A|b)$

$x \in R(A)$,

$x + r \in R(A|b)$

$Ar = b$

$Ax = 0$

$$A(x + r) = b \Leftarrow$$

$Ax = b$ and nonsingular $\iff \exists\ d(A) = d(A) \neq 0$

$(c_1, \ldots, c_n) \in K^n$

$$\sum_{j=1}^{n} c_j D_j(A) = b \iff$$

$\iff b \in [D_1(A), \ldots, D_n(A)]$

$\iff [D_1(A), \ldots, D_n(A)] = [D_1(A), \ldots, D_n(A), b]$

$$J, \quad J', \quad R \quad R = |J'|$$

$$\left(\begin{array}{cccccc|c} 1 & 0 & 0 & 3 & \frac{1}{4} & 0 & 2 \\ 0 & 1 & 0 & 4 & 3 & -1 & -1 \\ 0 & 0 & 1 & 1 & -6 & 6 & -\frac{2}{7} \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{array}\right)$$

$x_4 = x_5 = x_6 = 0$

$x_1 = 2, \quad x_2 = -1, \quad x_3 = -\frac{2}{7}$

$\left(2, -1, -\frac{2}{7}, 0, 0, 0\right)$ PART. RES.

$x_4 = 1, \quad x_5 = 0, \quad x_6 = 0$

$x_1 = -3, \quad x_2 = -4, \quad x_3 = -1.$

$(-3, -4, -1, 1, 0, 0)$

$(-\frac{1}{4}, -2, 5, 0, 1, 0)$

$(0, 1, -6, 0, 0, 1)$