$$\ell(h_0, \dots, h_n) \overset{\subset}{=} \underline{h_0 + [h_1 - h_0, \dots]}$$

$$q = \sum_{i=0}^{n} k_i h_i, \quad \sum k_i = 1$$

$$\| $$

$$k_0 h_0 + \overbrace{k_1 h_1 + \dots + k_n h_n}^{1-k_0}$$

$$+ (1-k_0) h_0 - (\underline{1-k_0}) h_0 =$$

$$= \underline{h_0 + k_1(\underline{h_1 - h_0}) + \quad + k_n(\underline{h_n - h_0})}$$

$M \cap N$ AP $\Rightarrow M \cap N \neq \emptyset$

$\Leftarrow M \cap N \neq \emptyset \quad \exists p \in M \cap N$

$q_1, q_2 \in M \cap N \overset{?}{\Rightarrow}$

$(1-\lambda) q_1 + \lambda q_2 \in M \cap N$

$\underbrace{\quad \in M \cap N \qquad \in M \cap N \quad}_{\in M \cap N}$

$p + \mathrm{Dir}(M \cap N) \subseteq p + \mathrm{Dir}(M)$

$\mathrm{Dir}(M \cap N) \subseteq \mathrm{Dir}(M) \cap \mathrm{Dir}(N)$

$u \in \mathrm{Din}(M) \cap \mathrm{Din}(N)$

$u = q - p = q' - p$

$q \in M!$ $\quad \in N$

$\Rightarrow q = q' \quad \Rightarrow u \in \mathrm{Din}(M \cap N)$

$\exists\, p \in M,\ \exists\, q \in N$

$q - p \in V = \mathrm{Dir}\, M + \mathrm{Dir}\, N$

$\exists\, u, v \quad u \in \mathrm{Dir}(M),$
$\qquad\qquad v \in \mathrm{Dir}(N)$

$q - p = u + v$

$$r = \underbrace{\underbrace{q}_{\in N} - \underbrace{v}_{\in \mathrm{Dir}(N)}}_{\in N} = \underline{\underbrace{p}_{\in M} + \underbrace{u}_{\in \mathrm{Dir}\, M}} \in M$$

$\underline{r \in M \cap N}$

$$M \sqcup N = \overrightarrow{M + ([q-p] + D_i \cap N)}^{\;AP}$$

$$= \boxed{p + (D_i \cap M} + [q-p] + \overrightarrow{D_i \cap N)}$$

$$M \quad \subseteq \qquad \cancel{p} + q - \cancel{p} + D_i \cap N$$

$$N \quad \subseteq$$

$$M \cup N \quad \subseteq$$

$$\underline{\underline{\ell(M \cup N) = M \sqcup N}}$$

$$M \cup N = M + ([q-p] + D \cap N)$$

$$\supseteq$$

$$r = p + u + k(q-p) + v$$

$$u \in D \cap M \qquad v \in D \cap N$$

$$= kq + (1-k)p + u + v$$

$$= \underbrace{\underbrace{k\left(q + \frac{1}{k}v\right)}_{\in N} + \underbrace{(1-k)\left(p + \frac{1}{1-k}u\right)}_{\in M}}_{\in M \cup N}$$

$M = p + S \ , \ N = q + T$

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

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

$S \cap T \ni u \ , \ u \neq 0$

$\dim S \geq 1 \ , \ \dim T \geq 1$

$\dim S \cap T \geq 1$

$\dim S \cap T \leq \min(\dim S, \dim T) - 1$

$\dim(S+T) = \dim S + \dim T - \dim(S \cap T)$

$\geq \dim S + \dim T - \min(\dim \ ) + 1$

$= \max(\dim S, \dim T) + 1 \Rightarrow 3$

≥ 2

$\dim(S+T) \geq 3 \Rightarrow \dim V \geq 4$

$f : V \to U$

f je a. $\iff$ $f = \varphi + u$

$$\boxed{f(0)} = \underbrace{\varphi(0)}_{= 0} + u \qquad u := f(0)$$

$$f(\underline{a}x + \underline{b}y + (1-a-b)0)$$

$$\varphi = f - u$$

$$\varphi(ax + by) = f(ax + by) - f(0)$$

$$a\varphi(x) + b\varphi(y) = a f(x) - a f(0) + b f(y) - b f(0)$$

$$f(ax + by + (1-a-b)\,0) =$$

$$= a f(x) + b f(y) + (1-a-b) f(0)$$

$$= a \varphi(x) + b \varphi(y) + f(0)$$

$$\varphi(ax + by) = a\varphi(x) + b\varphi(y)$$

$$f(\alpha p + (1-\alpha) q) =$$

$$\varphi(\alpha p + (1-\alpha) q) + c =$$

$$\alpha \varphi(p) + (1-\alpha)\varphi(q) + \alpha c + (1-\alpha) c$$

$$\alpha f(p) + (1-\alpha) f(q)$$

$Ax = b$ má řešení x

$$b = \sum_{j=1}^{n} x_j A^j \iff$$

$$b \in [A^1, \dots, A^n] \iff$$

$$[A^1, \dots, A^n] = [b, A^1, \dots, A^n]$$

$$\iff \dim[A^1, \dots, A^n] = \dim[b, A^1, \dots]$$

$$\iff h_r(A) = h_r(A|b)$$

$$N = \begin{pmatrix} 3 \\ 0 \\ 1 \\ 1 \end{pmatrix} + \begin{bmatrix} 1 & 1 & 4 \\ -1 & 1 & 3 \\ 1 & 1 & 3 \\ 1 & -1 & 4 \end{bmatrix}$$

$$q-p \qquad r-p \qquad p-p$$

$$\left(\begin{array}{cccc|ccc|c} 1 & 0 & 0 & 0 & 1 & 1 & 4 & 3 \\ 0 & 1 & 0 & 0 & -1 & 1 & 3 & 0 \\ 0 & 0 & 1 & 0 & 1 & 1 & 3 & 1 \\ 0 & 0 & 0 & 1 & 1 & -1 & 4 & 1 \end{array}\right) \sim$$

$$\sim \left(\begin{array}{cccc|ccc|c} 1 & 0 & 0 & 0 & 1 & 1 & 4 & 3 \\ 1 & 1 & 0 & 0 & 0 & 2 & 7 & 3 \\ 0 & 1 & 1 & 0 & 0 & 2 & 6 & 1 \\ 0 & 1 & 0 & 1 & 0 & 0 & 7 & 1 \end{array}\right)$$

$$\left(\begin{array}{cccc|ccc|c} 1 & 0 & 0 & 0 & 1 & 1 & 4 & 3 \\ 1 & 1 & 0 & 0 & 0 & 2 & 7 & 3 \\ -1 & 0 & 1 & 0 & 0 & 0 & -1 & -2 \\ -7 & 1 & 7 & 1 & 0 & 0 & 0 & -13 \end{array}\right)$$

$$-7x_1 + x_2 + 7x_3 + x_4 = -13$$

$$x_1 - x_2 + x_3 - x_4 = 1$$

$$x_1 + x_2 - x_3 + x_4 = 3$$

$$\left(\begin{array}{cccc|c} 1 & -1 & 1 & -1 & 1 \\ 1 & 1 & -1 & 1 & 3 \\ -7 & 1 & 7 & 1 & -13 \end{array}\right) \sim$$

$$\left(\begin{array}{cccc|c} 1 & -1 & 1 & -1 & 1 \\ 0 & 2 & -2 & 2 & 2 \\ 0 & -6 & 14 & -6 & -6 \end{array}\right) \sim$$

$$\left(\begin{array}{cccc|c} 1 & -1 & 1 & -1 & 1 \\ 0 & 1 & -1 & 1 & 1 \\ 0 & 0 & 8 & 0 & 0 \end{array}\right)$$

$x_3 = 0 \qquad x_4 = t$

$x_2 = 1 - t$

$x_1 = 1 + x_2 + t = 2$