Lin. rovnice

$ax + by = c$

$$\left.\begin{aligned} a_{11}x_1 + \dots + a_{1n}x_n &= b_1 \\ &\vdots \\ a_{k1}x_1 + \dots + a_{kn}x_n &= b_k \end{aligned}\right\} k$$

n

$\varphi : \mathbb{R}^n \to \mathbb{R}^k$

$A \cdot x = b$

$\in \quad \in$

$\mathbb{R}^n \quad \mathbb{R}^k$

$\varphi(x) = b$

$\varphi(y) = b$

$\Rightarrow \varphi(x - y) = 0 \quad \left| \begin{array}{l} \varphi(z) = 0 \\ \varphi(x) = b \end{array} \right. \quad \varphi(x + z) = b$

z

$\varphi : V \to W$

$\quad \cup \qquad\quad \cup$

$\quad \mathbb{R}^n \qquad \mathbb{R}^k$

k - rovnic

po n proměnných

$\Updownarrow$

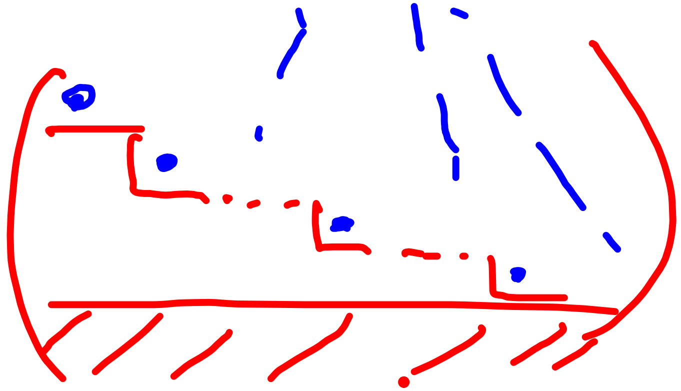
$\dim(\varphi(V)) = k$

nezávislé rovnice $\quad \varphi(x) = 0$

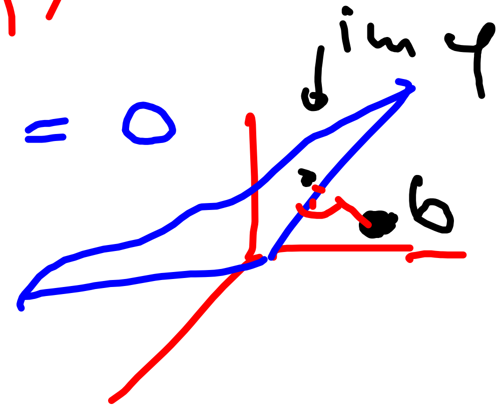
$\Updownarrow$

k parametrů?

$\dim(\ker \varphi) = n - k$

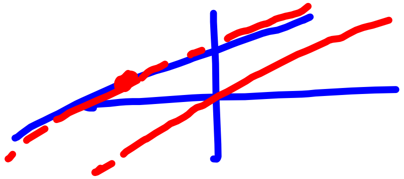


$x_1 + x_2 + x_3 = 0$



$\varphi(x) = b$ $\quad$ pro pevné $x \mapsto x + \ker(\varphi)$ = přímka

$a x_1 + b x_2 = c$



$x \longmapsto A \cdot x \longmapsto A^2 \cdot x \longmapsto \dots$

stav 0 — stav 1 — stav 2

$$\begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \end{pmatrix} = x$$

x_i .. počet i-letých smrků

$f_i \cdot x_i$ .. "přeživší"

τ_1 .. "porodnost"

$Ax = \lambda x \quad \dots \quad A^k x = \lambda^k x$

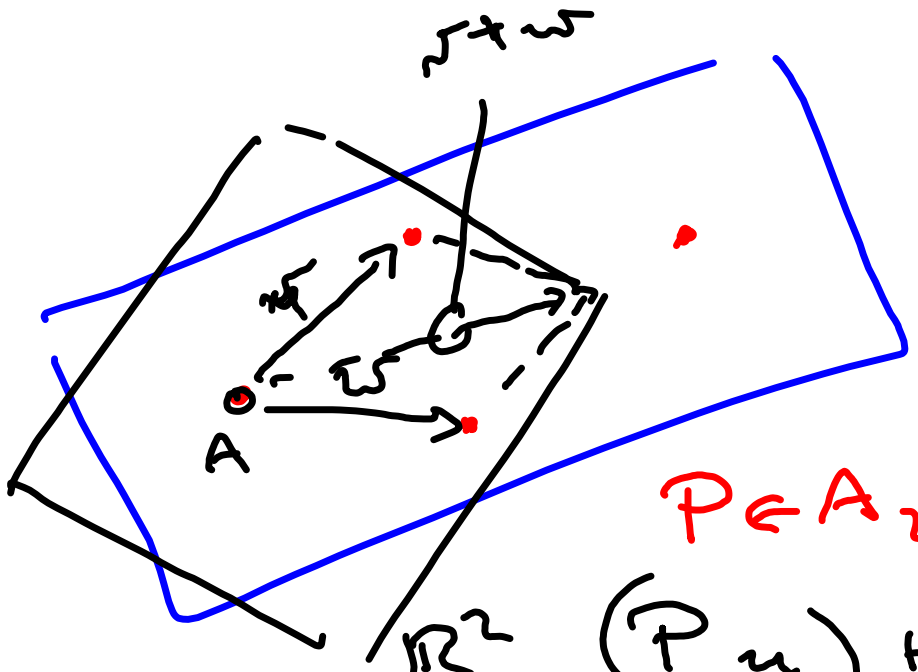
$u = u_1 + u_2 + u_3 + u_4 + u_5$

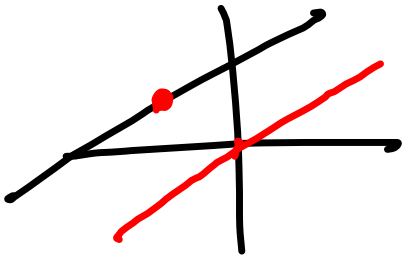
$A^k u = \lambda_1^k u_1 + \lambda_2^k u_2 + \dots + \lambda_5^k u_5$

$|\lambda_1| = \lambda_1 = 1{,}03$

$|\lambda_i| < 1$

$\Rightarrow$

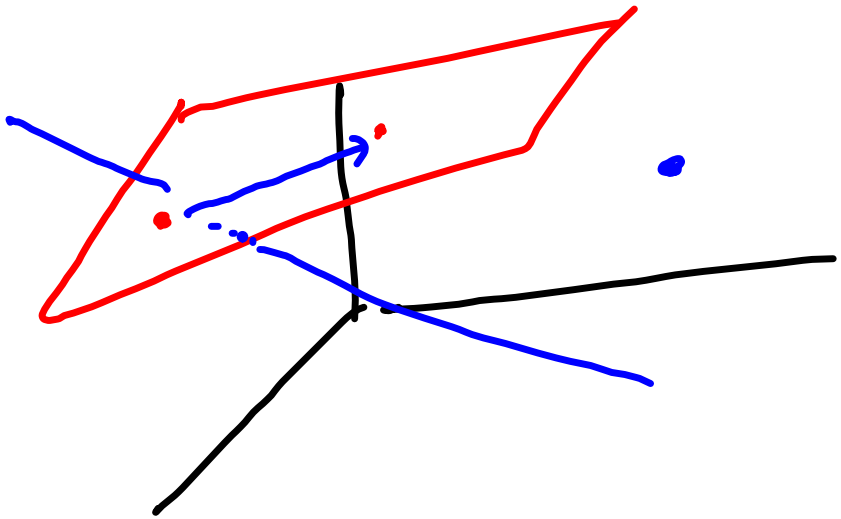




$\mathbb{R}^2 = A_2$

$P \in A_2 \quad u \in \mathbb{R}^2$

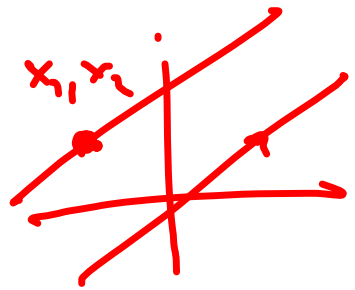
$\mathbb{R}^2 \quad (P, u) \longmapsto P + u$



$A \subset \mathbb{R}^n$

$P = (x_1, \dots, x_n)$

$u = (a_1, \dots, a_n)$



$P + u = (x_1 + a_1, \dots, x_n + a_n)$

$A = P + V \Rightarrow (u_1, \dots, u_k)$

$\Updownarrow$

parametricky

$p: (p_1, p_2) + t(a_1, a_2)$

$\Downarrow$

$P: \quad x = p_1 + t a_1$

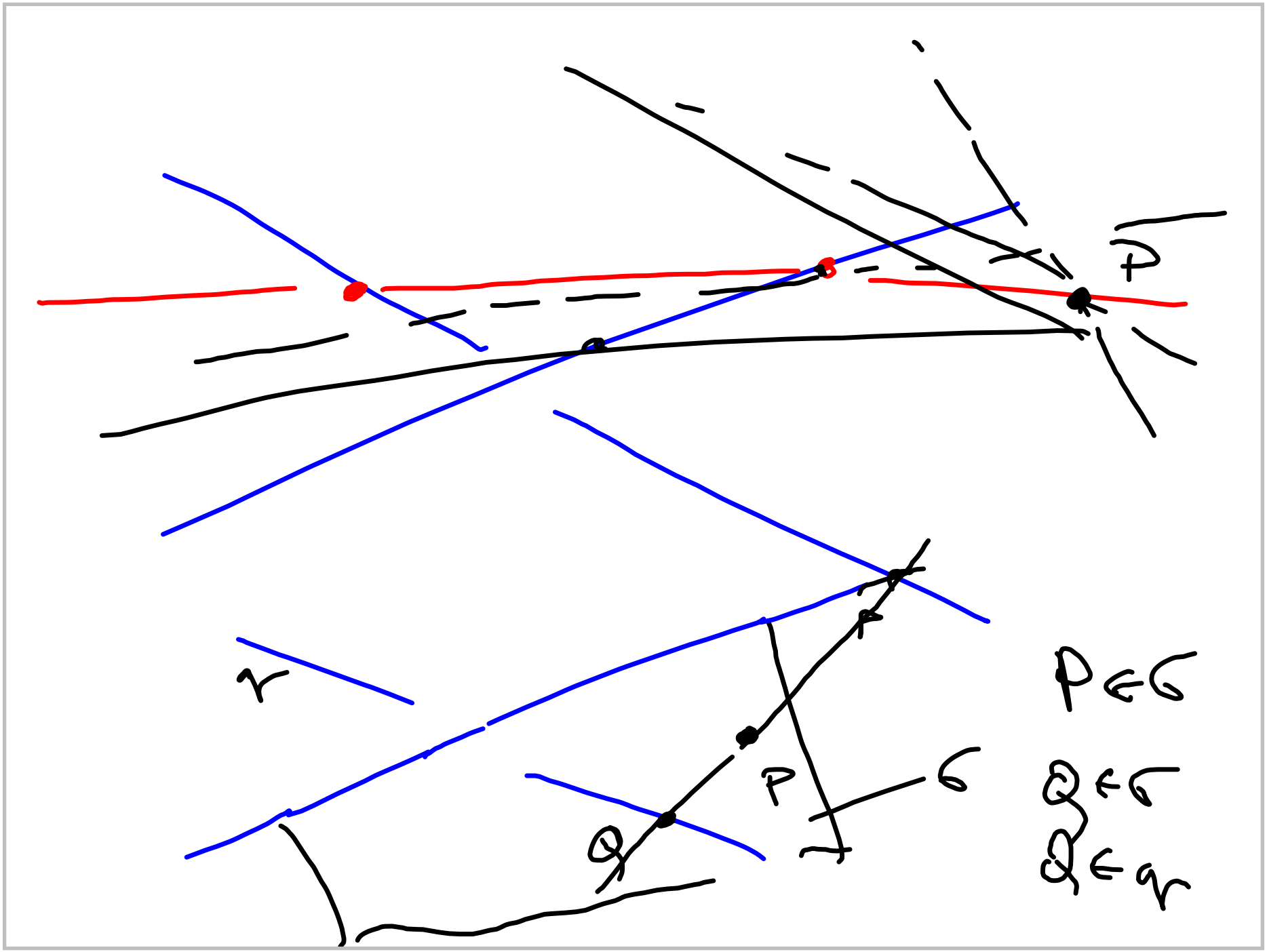
$\quad\quad y = p_2 + t a_2$

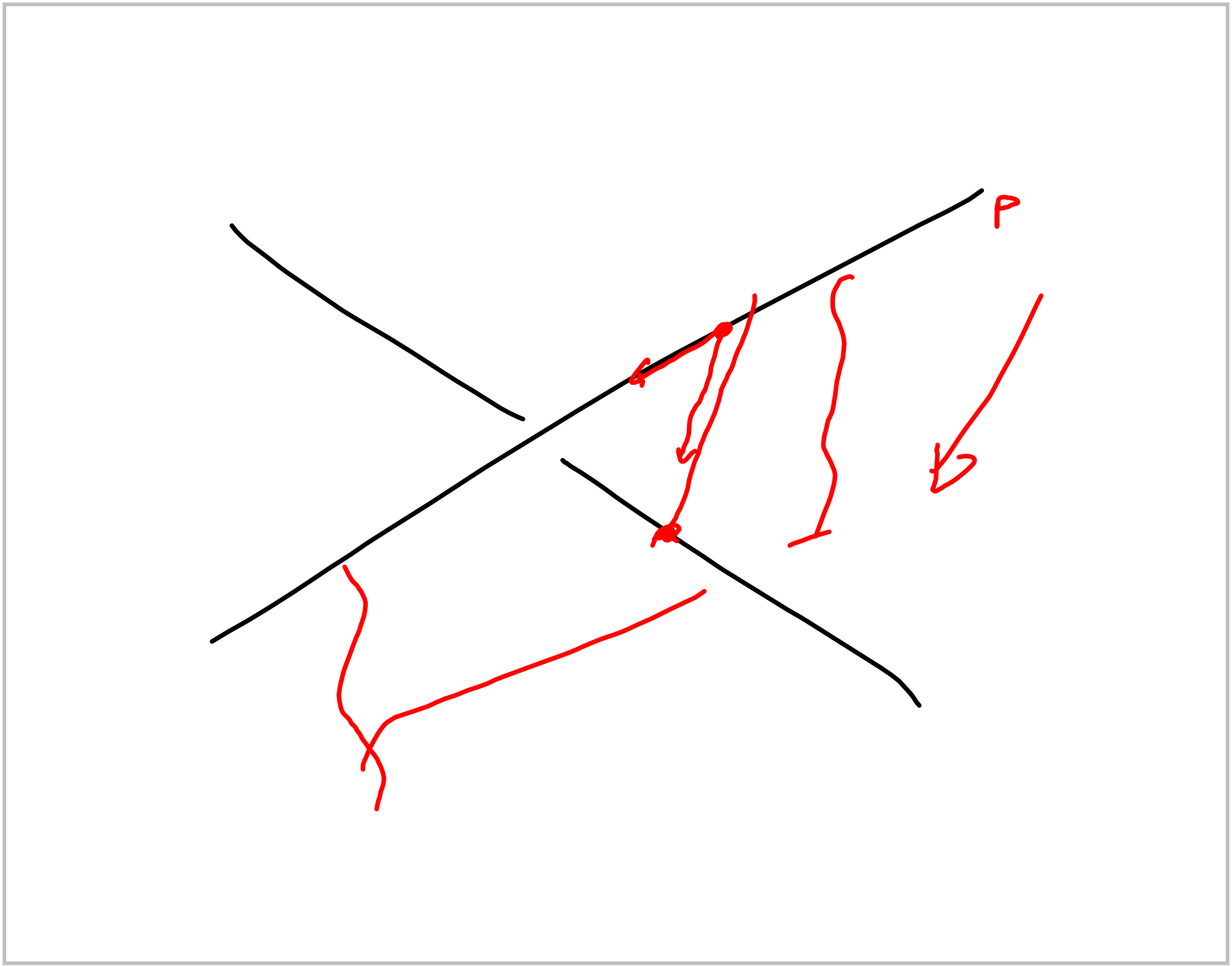
$A = \{ \varphi(x) = b \}$

$\Rightarrow$ soustava t, regulární $\Rightarrow$

1 rovnice pro t

$p_1 + t a_1 = q_1 + s b_1$


p
r
p
q
p ∈ σ
q ∈ σ
q ∈ r


P
A
B