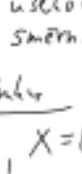
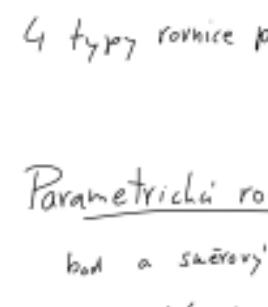


## Geometrický útvar

Definice: Geometrický útvar je množina bodů Eukleidovského prostoru (tj.  $\mathbb{R}^n$ )



Definice: Analytické vyjádření GU

vztaž který spojuje souřadnice všech bodů GU

Dnes  $\mathbb{R}^2$

### Přímka

- 1D základní GU

4 typy rovnice přímky: parametrický  
obecný  
všeobecný  
směrnicový

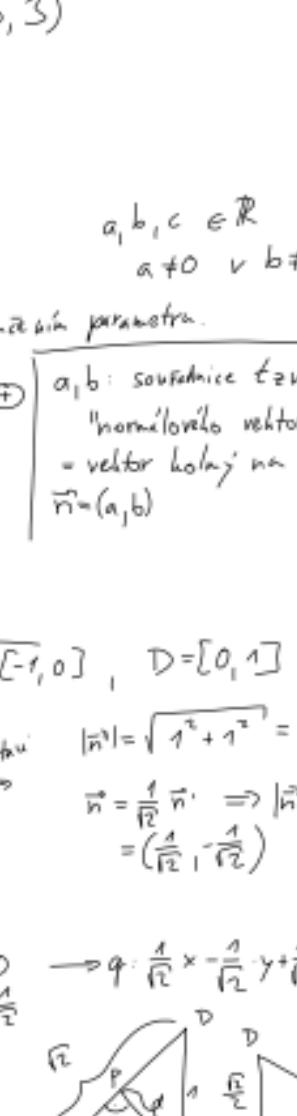
### Parametrická rovnice přímky

bod a směrový vektor  $\vec{u}$ ,  $X = [x, y]$

$$p: X = A + t \cdot \vec{u}$$

postupně:

$$p: \begin{aligned} x &= A_x + t \cdot u_x \\ y &= A_y + t \cdot u_y \end{aligned}$$



- A může být libovolný bod přímky
- $\vec{u}$  může mít libovolnou normálnou velikost

$$p: A = [-1, 0] \quad B = [2, 3]$$

směrový vektor:  $\vec{u} = \overrightarrow{AB} = (3, 3)$

$$p: \begin{aligned} x &= -1 + t \cdot 3 \\ y &= 0 + t \cdot 3 \end{aligned}$$

### Obecná rovnice přímky

$$ax + by + c = 0$$

$$a, b, c \in \mathbb{R} \quad a \neq 0 \vee b \neq 0$$

- z parametrického vydáme využitím parametru.

$$q: \begin{aligned} x &= 1 - t \\ y &= 2 - t \end{aligned} \quad /(-1) \quad \left\{ \begin{array}{l} a, b: \text{souřadnice } t \text{ zv.} \\ \text{"normálového vektora"} \\ = \text{vektor kolaj na přímku} \end{array} \right.$$

$$x - 2y = -3 + 0 \cdot t$$

$$x - 2y + 3 = 0$$

$$\vec{u}_q = (-2, -1) \quad \vec{n}_q = (1, -2)$$

$$\vec{u}_q \cdot \vec{n}_q = -2 + 2 = 0$$

$$příklad: q: dleto body C = [-1, 0], D = [0, 1]$$

$$\vec{u} = \overrightarrow{CD} = (1, 1)$$

$$\vec{n} = (1, -1)$$

$$a \cdot x + b \cdot y + c = 0$$

$$c = \frac{1}{\sqrt{2}}$$

$$q: \frac{1}{\sqrt{2}}x - \frac{1}{\sqrt{2}}y + \frac{1}{\sqrt{2}} = 0$$

$$Ceq: \frac{1}{\sqrt{2}} \cdot \frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}} \cdot 0 + c = 0 \rightarrow q: \frac{1}{\sqrt{2}}x - \frac{1}{\sqrt{2}}y + \frac{1}{\sqrt{2}} = 0$$

$$d = \sqrt{1 - \left(\frac{1}{\sqrt{2}}\right)^2} = \sqrt{1 - \frac{1}{2}} = \frac{1}{\sqrt{2}}$$

$$\text{Pokud } |\vec{n}| = 1 \Rightarrow c \text{ je výškou vzdálosti přímky od počátku.}$$

$$q: \frac{1}{\sqrt{2}}x - \frac{1}{\sqrt{2}}y + \frac{1}{\sqrt{2}} = 0 \quad / \sqrt{2}$$

$$q: x - y + 1 = 0$$

$$\vec{u} = (u_x, u_y) \Rightarrow \vec{n}_u = (u_y, -u_x) \quad \vec{n}_u \cdot \vec{u} = \vec{n}_u \cdot \vec{u} = 0$$

$$\vec{n}_u = (-u_y, u_x)$$

### Směrnicová rovnice

$$p: y = k \cdot x + q$$

k... směrnice (slope)

$$q... \text{absolutní člen} (intercept)$$

$q = -\frac{c}{b}$

$$\phi = \tan \phi$$

$\phi = 0 \Rightarrow \tan \phi = k = 0$

$$\phi = \frac{\pi}{2} \Rightarrow k = \infty$$

$\phi = \frac{\pi}{2} \Rightarrow k = 1$

$$\phi = \frac{\pi}{2} \Rightarrow k = -1$$

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