

# Rovnice přímky

Napište všechny rovnice přímky p dané body A, B

$$1) A = [-1, 2] \quad B = [3, 4]$$

$$\vec{u} = \vec{AB} = (4, 2)$$

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

$$p: \begin{cases} x = 3 + 4t \\ y = 4 + 2t \end{cases}$$

$$t = -1: \begin{cases} x = -1 \\ y = 2 \end{cases} \} A$$

$$p = \{ [3 + 4t, 4 + 2t], t \in \mathbb{R} \}$$

$$\vec{u}_p = (4, 2)$$

$$\vec{n}_p = (2, -4)$$

$$p: ax + by + c = 0$$

$$\vec{n} = (a, b)$$

$$2x - 4y + c = 0$$

$$\text{Bep: } 2 \cdot 3 - 4 \cdot 4 + c = 0$$

$$-10 + c = 0$$

$$c = 10$$

$$p: 2x - 4y + 10 = 0$$

$$\text{úsekový: } p: \frac{2x}{-10} - \frac{4y}{-10} = 1$$

$$p: \frac{x}{-5} + \frac{y}{\frac{5}{2}} = 1$$

$$r = -5$$

$$s = \frac{5}{2}$$

$$\text{směrnice: } p: y = \frac{1}{2}x + \frac{5}{2}$$

$$k = \tan \varphi = \frac{1}{2}$$

$$\varphi = \arctan\left(\frac{1}{2}\right) = 26,6^\circ$$

$$\tan^{-1}$$

Přímka q: A,  $\vec{u}$ . Rozhodněte, zda  $C \in q$ .

$$A = [1, 1] \quad \vec{u} = (2, 1) \quad C = [-5, -2]$$

$$q: \begin{cases} x = 1 + 2t \\ y = 1 + t \end{cases} \quad \begin{cases} -5 = 1 + 2t \rightarrow t = -3 \\ -2 = 1 + t \rightarrow t = -3 \end{cases} \checkmark \Rightarrow C \in q$$

$$D = [2, 1] \quad \begin{cases} 2 = 1 + 2t \rightarrow t = \frac{1}{2} \\ 1 = 1 + t \rightarrow t = 0 \end{cases} \times \Rightarrow D \notin q$$

Najděte přímku q tak, aby  $q \perp p$  a  $C \in q$

$$p = \{ [2 + t, 1 + \frac{5}{2}t], t \in \mathbb{R} \} \quad C = [2, 2]$$

$$\vec{u}_p = (1, \frac{5}{2})$$

\* Obecnou rovnici

$$p \perp q \Rightarrow \vec{n}_q = \vec{u}_p$$

$$\vec{n}_q = (1, \frac{5}{2})$$

$$q: ax + by + c = 0$$

$$x + \frac{5}{2}y + c = 0$$

$$C \in q: 2 + \frac{5}{2} \cdot 2 + c = 0 \Rightarrow q: 2 + \frac{5}{2}y - 7 = 0 \quad / \cdot 2$$

$$c = -7$$

$$4 + 5y - 14 = 0$$

Najděte všechny rovnice přímky p.

$$A \in p, p \perp x \quad A = [3, -2]$$

$$p: x = 3$$

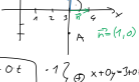
$$p: 1 \cdot x + 0 \cdot y + c = 0$$

$$x + c = 0$$

$$A \in p: 3 + c = 0$$

$$c = -3$$

$$p: x - 3 = 0$$



$$p: \begin{cases} x = 3 + 0t \\ y = -2 + 1t \end{cases} \cdot \begin{cases} 1 \\ 0 \end{cases} \oplus \begin{cases} x + 0y = 3 + 0t \\ x = 3 \end{cases}$$

$A \in p \quad A = [1, 2\sqrt{3}]$ , směrový úhel  $\varphi = 120^\circ$

$p \ni A$

$$p: y = k \cdot x + q \quad k = \tan \varphi = \tan \frac{2}{3}\pi = \frac{\sin \frac{2}{3}\pi}{\cos \frac{2}{3}\pi} = \frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = -\sqrt{3}$$

$$p: y = -\sqrt{3} \cdot x + q$$

$$A \in p: 2\sqrt{3} = -\sqrt{3} \cdot 1 + q$$

$$q = 3\sqrt{3}$$

$$p: y = -\sqrt{3}x + 3\sqrt{3}$$

$$p: \frac{x}{1} + \frac{y}{3\sqrt{3}} = 1$$

$$p: \sqrt{3}x + y - 3\sqrt{3} = 0$$

$$p: x = 1 + t$$

$$y = 2\sqrt{3} - \sqrt{3} \cdot t$$

## Vzájemná poloha přímek

Vyšetřete vzájemnou p. př. p a q

$p \neq q \Rightarrow$  najděte souřadnice průsečíku

$$1) p = \{ [1 + 2t, 2 - 3t], t \in \mathbb{R} \} \quad \vec{u}_p = (2, -3)$$

$$q = \{ [-1 + 2k, 7 - 3k], k \in \mathbb{R} \} \quad \vec{u}_q = (2, -3)$$

$$\bullet p = q \Rightarrow (A \in p \Rightarrow A \in q)$$

$$A = [1, 2] \quad A \in q? \quad \begin{cases} 1 = -1 + 2k \rightarrow k = 1 \\ 2 = 7 - 3k \rightarrow k = \frac{5}{3} \end{cases} \times \Rightarrow A \notin q$$

$$\rightarrow p \parallel q$$

$$\bullet p: x = 1 + 2t \quad q: x = -1 + 2k$$

$$y = 2 - 3t \quad y = 7 - 3k$$

$$\begin{cases} 1 + 2t = -1 + 2k \\ 2 - 3t = 7 - 3k \end{cases} \rightarrow \begin{cases} 2t - 2k = -2 \quad / \cdot \frac{3}{2} \\ -3t + 3k = 5 \end{cases} \oplus$$

$$0t + 0k = 2$$

$$0 = 2 \rightarrow \text{NR} \rightarrow \text{žádný společný bod}$$

$$\Rightarrow p \parallel q$$

$$\text{--"--} \quad p = \{ [1 + 2t, 2 - 3t], t \in \mathbb{R} \} \quad \vec{u}_p = (2, -3)$$

$$q: 2x + y - 1 = 0 \quad \vec{n}_q = (2, 1)$$

$$\vec{n}_q \cdot \vec{u}_p = 4 - 3 = 1$$

$$\vec{u}_p \neq \alpha \vec{n}_q \quad \forall \alpha \in \mathbb{R}$$

$$p: \begin{cases} x = 1 + 2t \quad / \cdot 3 \\ y = 2 - 3t \quad / \cdot 2 \end{cases} \oplus$$

$$3x + 2y = 7$$

$$p: 3x + 2y = 7$$

$$q: \begin{cases} 2x + y = 1 \quad / \cdot (-2) \\ -x + 0y = 5 \end{cases} \oplus$$

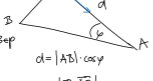
$$\begin{cases} x = -5 \\ y = 11 \end{cases}$$

$$p \cap q = \{P\}$$

$$P = [-5, 11]$$

Odkrytí vzorce pro vzdálenost bodu od přímky

$$p: ax + by + c = 0 \quad A = [A_x, A_y]$$



$$d = |AB| \cdot \cos \varphi$$

$$d = |AB| \cdot \frac{|\vec{n} \cdot \vec{AB}|}{|\vec{n}| \cdot |\vec{AB}|} =$$

$$= \frac{|\vec{n} \cdot \vec{AB}|}{|\vec{n}|}$$

$$\vec{AB} = \vec{B} - \vec{A}$$

$$= \frac{|\vec{n} \cdot (\vec{B} - \vec{A})|}{|\vec{n}|} = \frac{|a \cdot B_x + b \cdot B_y - c \cdot A_x - b \cdot A_y|}{|\vec{n}|}$$

$$\vec{n} = (a, b)$$

$$\text{Bep: } a \cdot B_x + b \cdot B_y + c = 0$$

$$-c = a \cdot B_x + b \cdot B_y$$

$$= \frac{|-c - a \cdot A_x - b \cdot A_y|}{\sqrt{a^2 + b^2}} = \frac{|a \cdot A_x + b \cdot A_y + c|}{\sqrt{a^2 + b^2}} = d$$

$$A = [0, 0] \Rightarrow d = \frac{|c|}{\sqrt{a^2 + b^2}}$$

Vypočítejte odstup přímek p a q

$$p: x + 2y - 1 = 0$$

$$q: 2x - y + 4 = 0$$

$$\vec{n}_p = (1, 2)$$

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

$$\vec{n}_p \cdot \vec{n}_q = 0 \Rightarrow \varphi = \frac{\pi}{2} \Rightarrow p \perp q$$

