Planimetrie

bod, přímka

10.1 Bod

+

0D 1D 2D

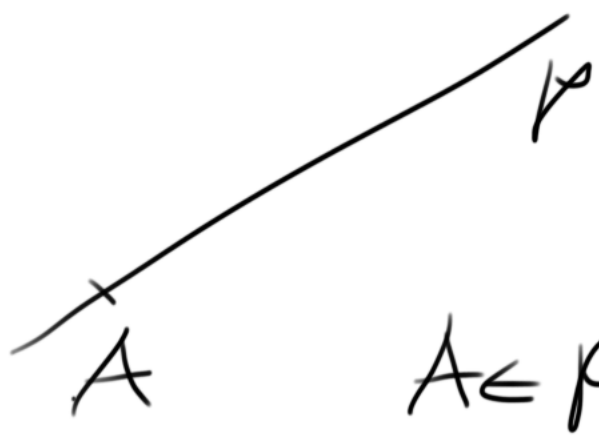
A B

+ +

A=B A B

shodné různé

A ≠ B

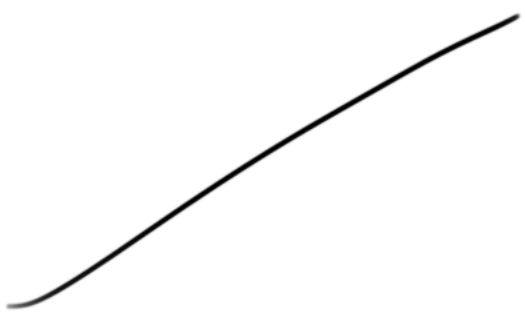


A A∈p

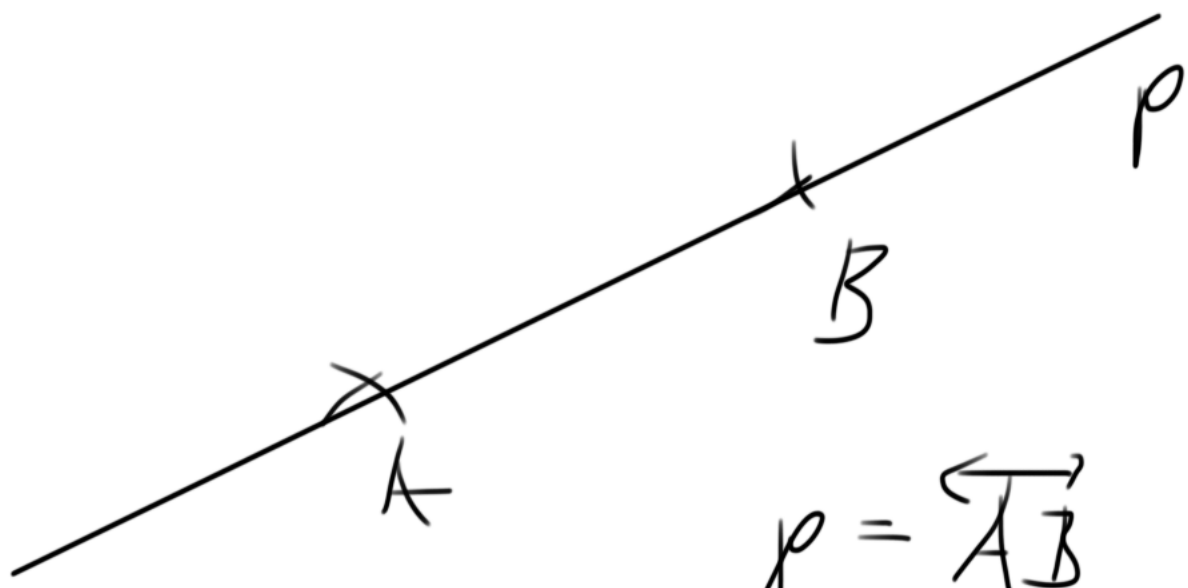
p q O

p ∩ q = O

10.1 Přímka



1D

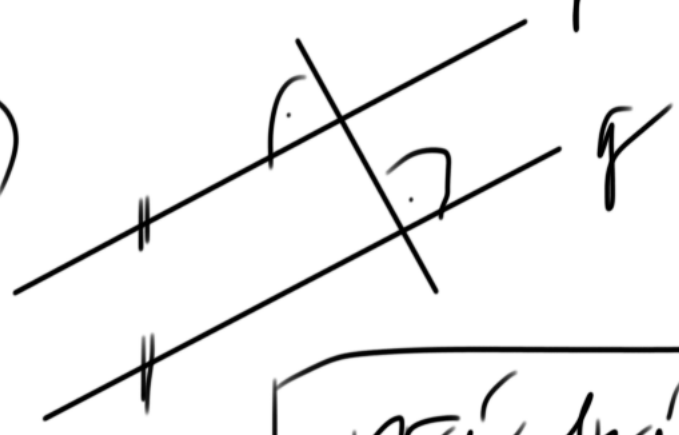


$p = \overleftrightarrow{AB}$

10.2 Vzájemná poloha

přímek

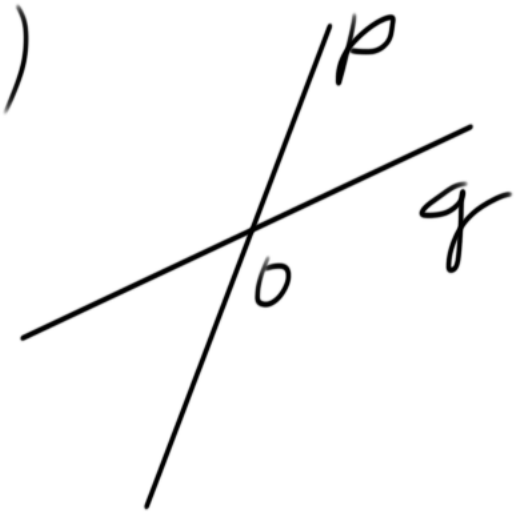
p, q přímky

a) 

rovnoběžné $p \parallel q$

$p \cap q = \{\}$

průsečík $\{\}, \emptyset \quad \{\emptyset\} \quad \{\{\}\}$

b) 

různoběžné $p \nparallel q$

$p \cap q = O$

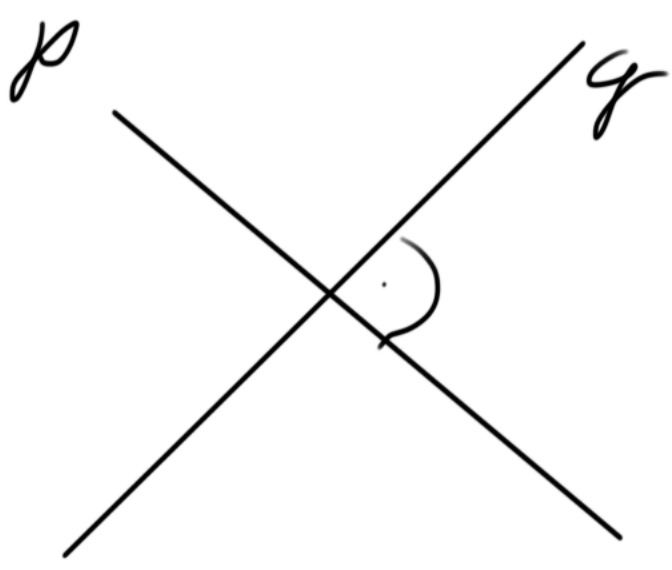
právě jeden sp. bod.

c) $p = q$

totožné

$p \cap q = p = q$

∞ mnoho sp. bodů

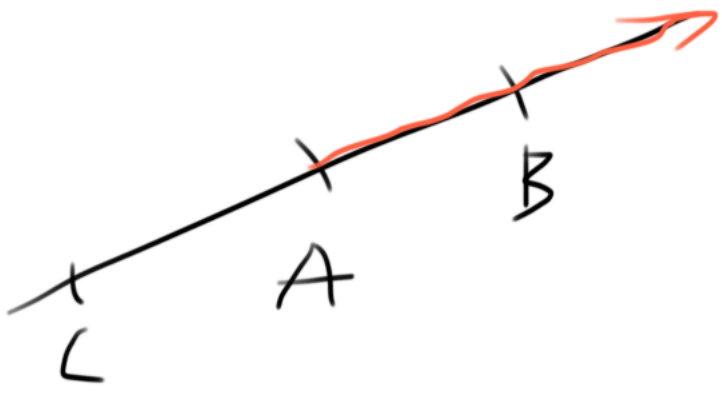


kolmé

svírají úhel 90°

$p \perp q$

10.2.2 Polopřímka a úsečka

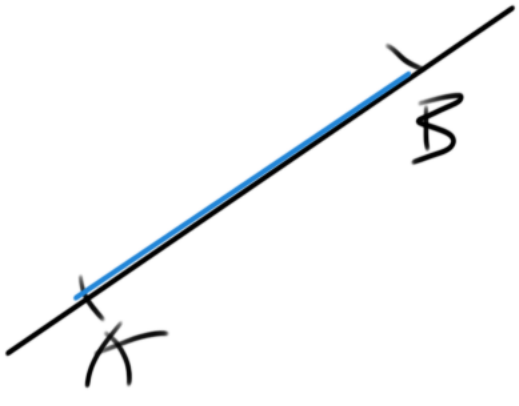


polopřímka

$\overrightarrow{AB}$

počáteční bod, pomocný

$\overrightarrow{AL}$ je opačná k $\overrightarrow{AB}$



úsečka: část přímky mezi 2 body

AB $|AB|$ ... velikost úsečky

10.3 rovinný úhel

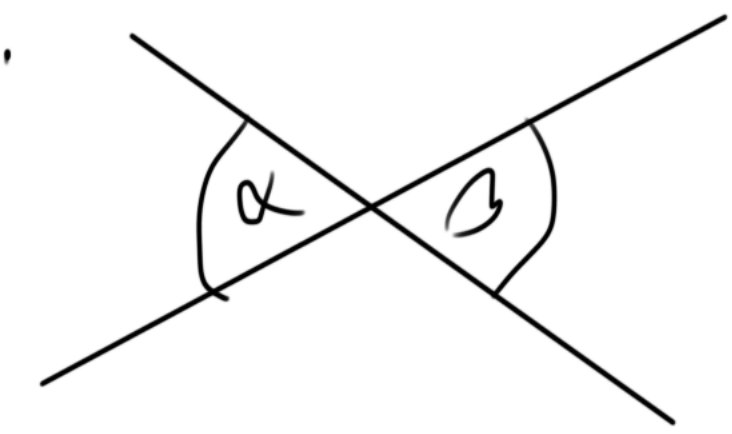
$\beta = \angle ABC$

$= \sphericalangle ABC$

B ... vrchol úhlu

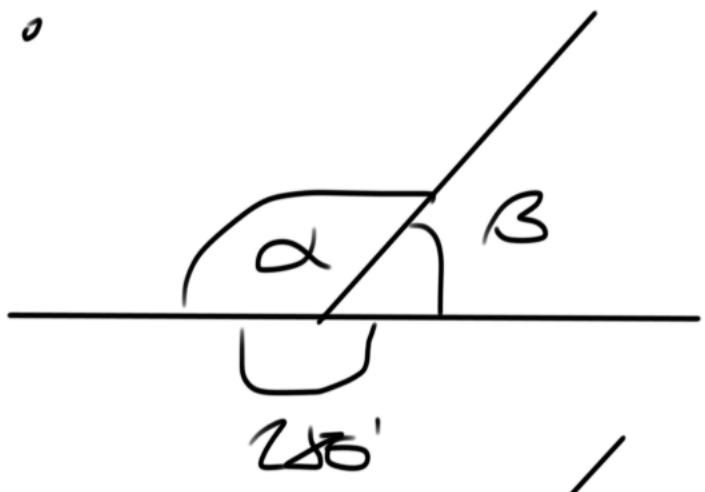
$\overrightarrow{BA}$, $\overrightarrow{BC}$ polopřímky

10.3.1 vztahy mezi rovinnými úhly



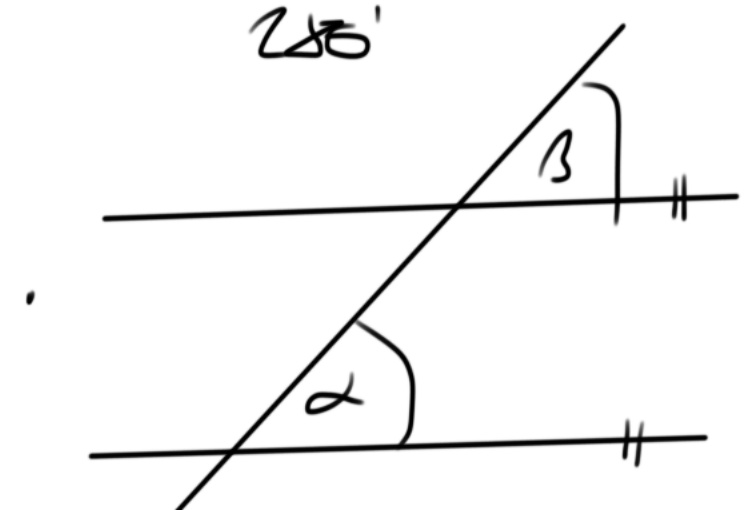
Vrcholové úhly

$\alpha = \beta$



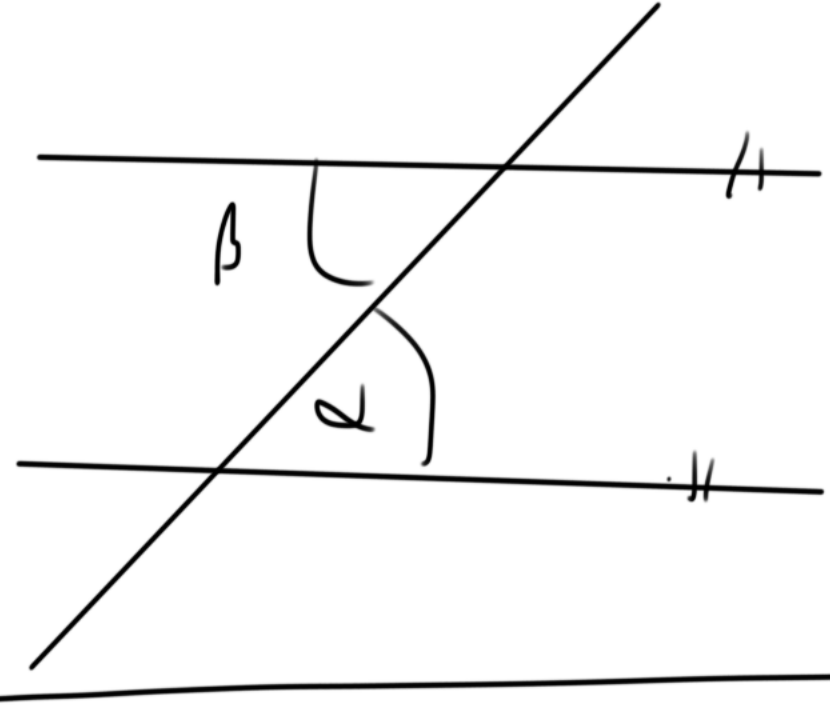
Vedlejší úhly

$\alpha + \beta = 180°$



Souhlasné úhly

$\alpha = \beta$



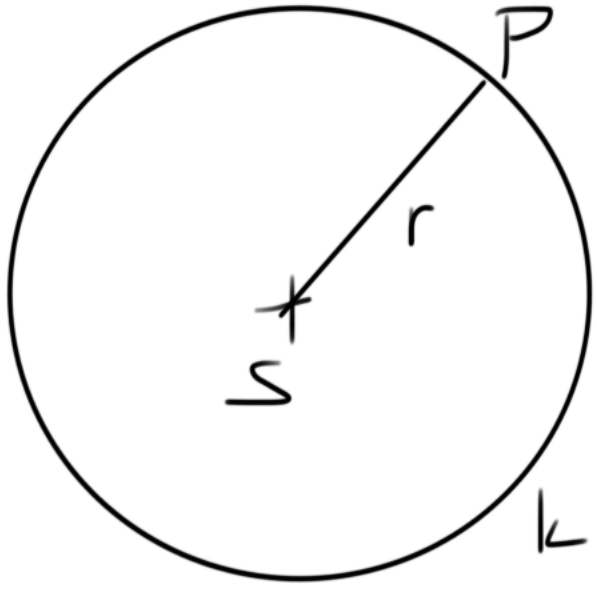
Střídavé úhly

$\alpha = \beta$

10.4. Kružnice a kruh

$k(S, r) = \{P \in \mathbb{R}^2 : |PS| = r\}$ Kružnice

S ... střed

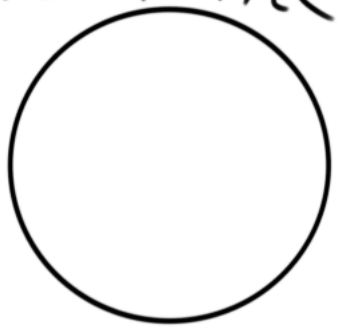


r ... poloměr

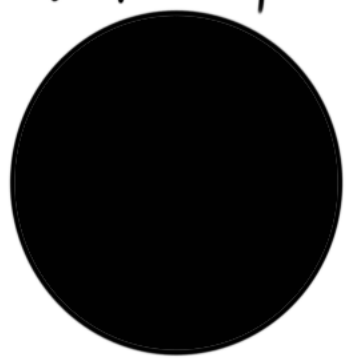
PS ... průvodič

kruh: $K(S, r) = \{P \in \mathbb{R}^2 : |PS| \leq r\}$

kružnice

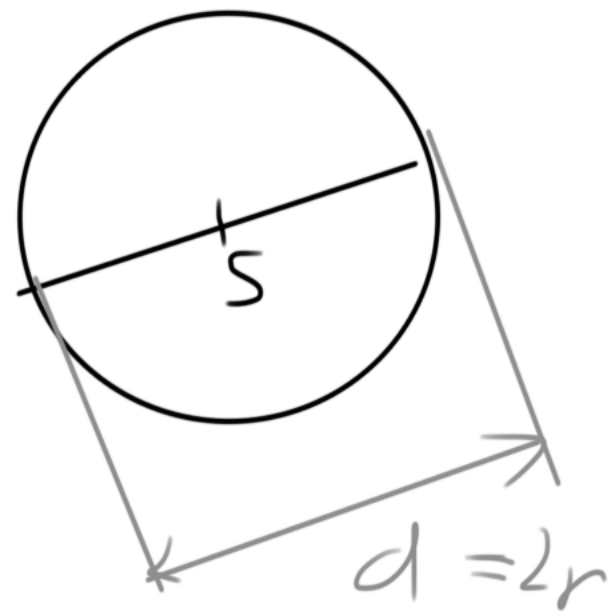


kruh



Obvod kruhu a kružnice $O = 2\pi \cdot r$

$= \pi d$



$d = 2r$
průměr

Obsah kruhu $S = \pi r^2 = \pi \frac{d^2}{4}$

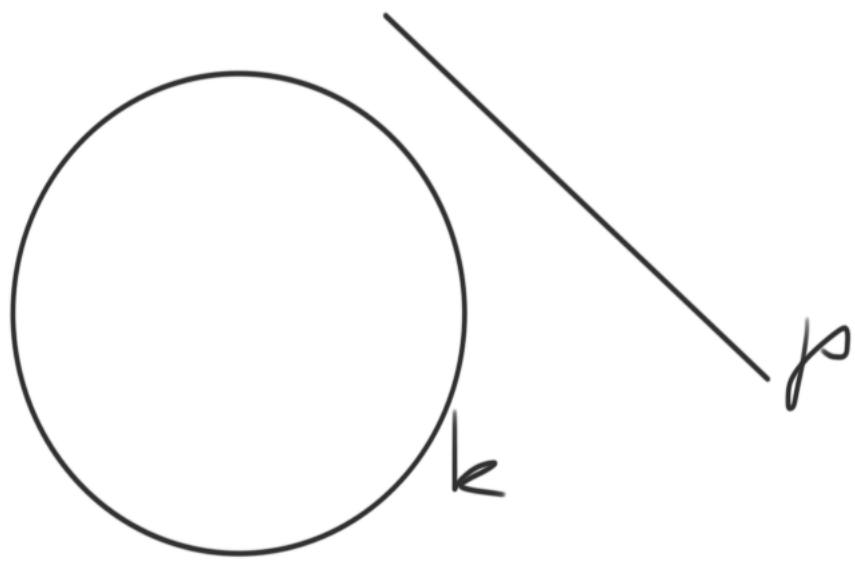
$r^2 \rightarrow 10_{cm} \cdot 10_{cm}$

$\cdot r = 10_{cm}$ $= 100_{cm^2}$

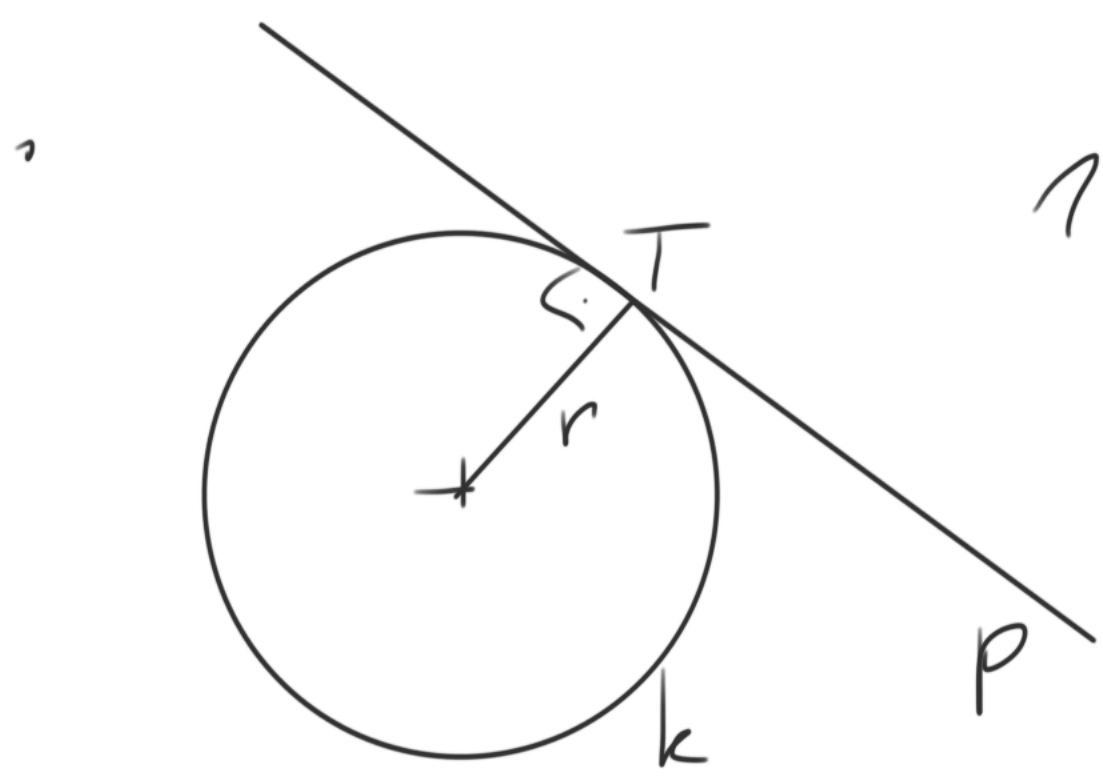
Obsah kružnice: $S = 0$

10.4.1. Vzájemná poloha kružnice a přímky

Mějme $k(S, r)$, p



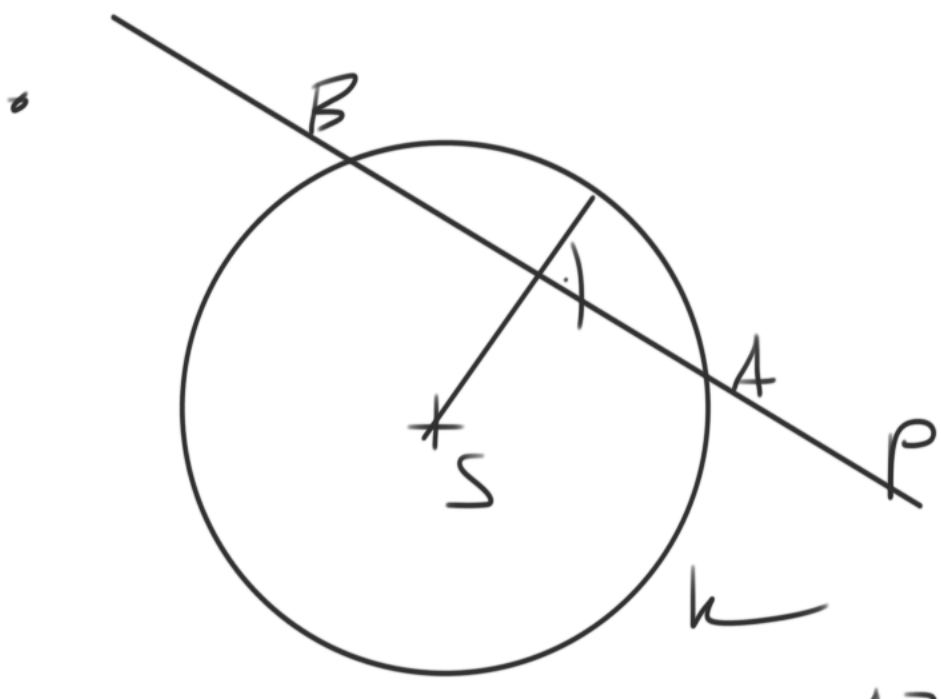
$p \cap k = \emptyset$



1 sp. bod

$p \cap k = T$

p .. "tečna"



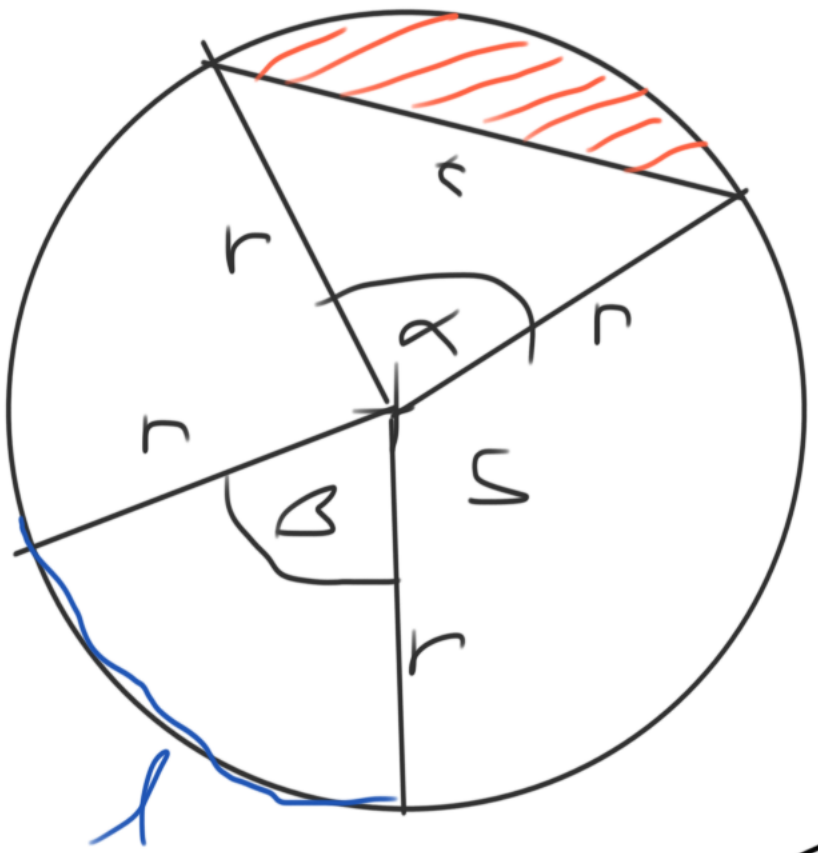
2 společné body

p .. sečna

$p \cap k = \{A, B\}$

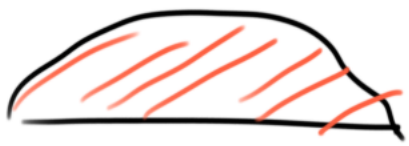
AB .. "tětiva"

10.4.2. Řezy v kružnici

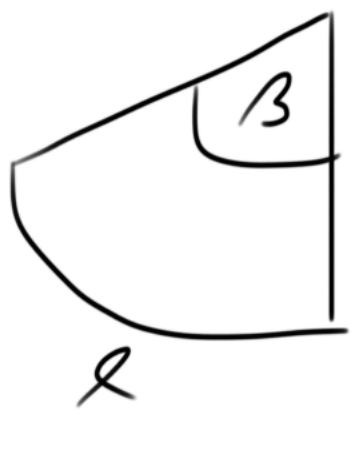


t ... tětiva

l ... oblouk



kruhová úseč

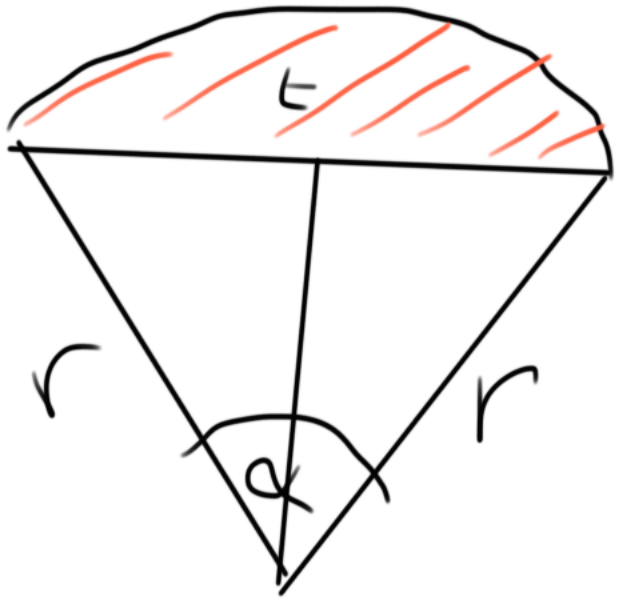


kruhová výseč

Délka oblouku l

$l = r \cdot \beta$

β .. v obloukové míře



$$\sin\frac{\alpha}{2} = \frac{\frac{t}{2}}{r}$$

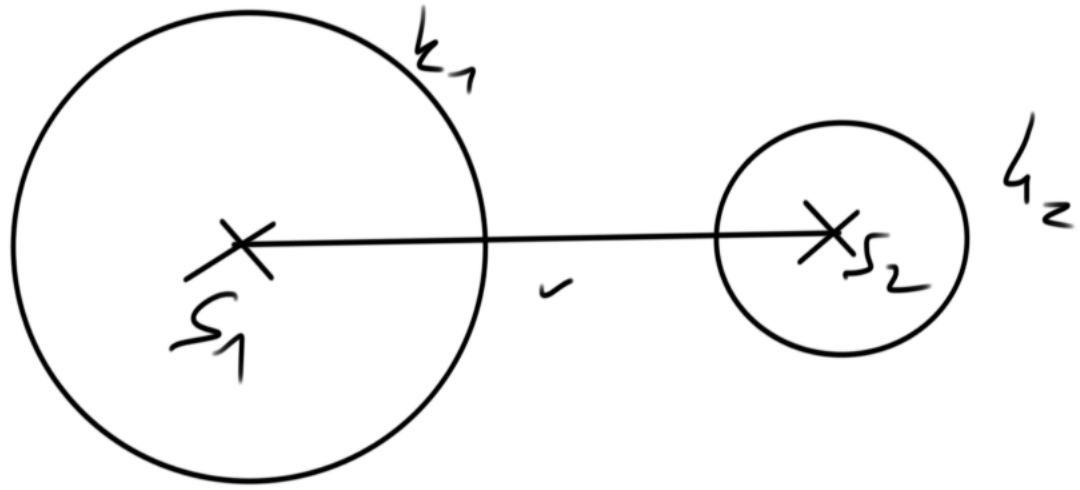
$$t = 2 \cdot r \cdot \sin\frac{\alpha}{2}$$

10.4.3 Vzájemná poloha 2 kružnic

$k_1(S_1, r_1)$, $k_2(S_2, r_2)$ | $r_1 > r_2$

$v = |S_1 S_2|$ .. vzdálenost středů

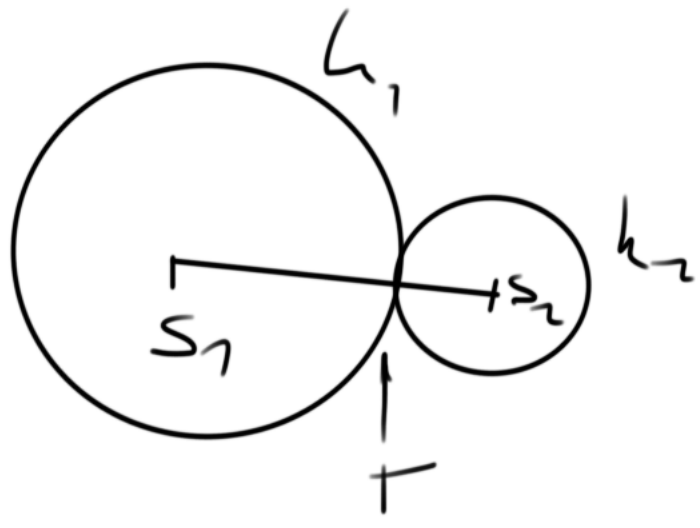
i)



$k_1 \cap k_2 = \emptyset$

$r_1 + r_2 < v$

ii)

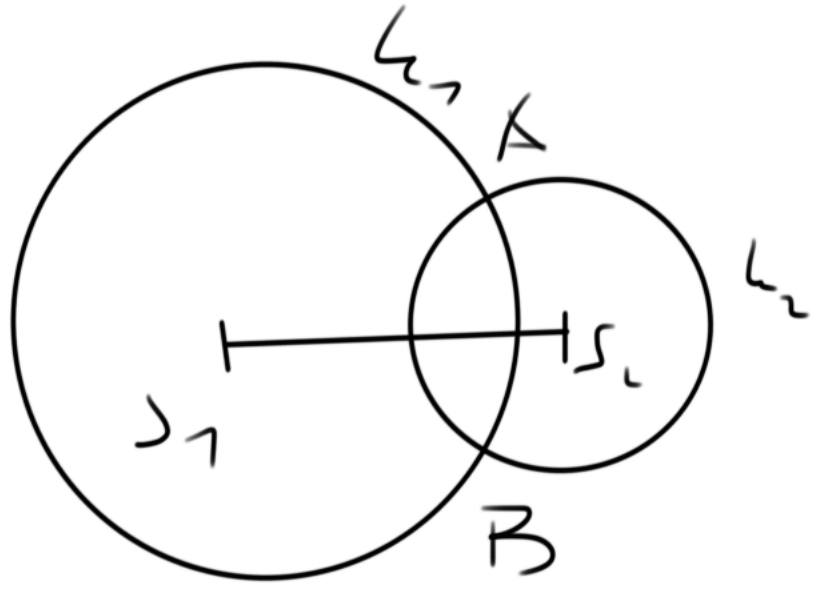


$k_1 \cap k_2 = T$

$r_1 + r_2 = v$

vnější dotyk

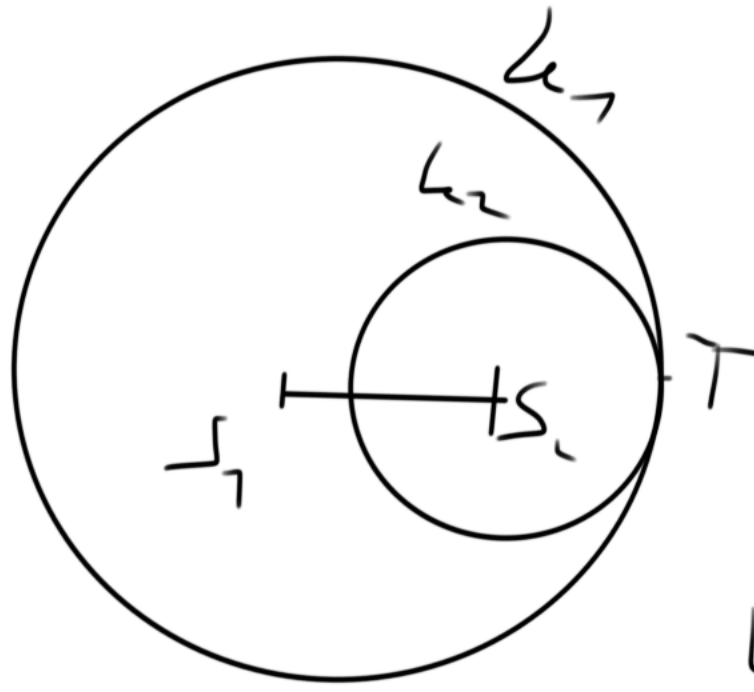
iii)



$k_1 \cap k_2 = \{A, B\}$

$r_1 + r_2 > v > r_1$

iv)

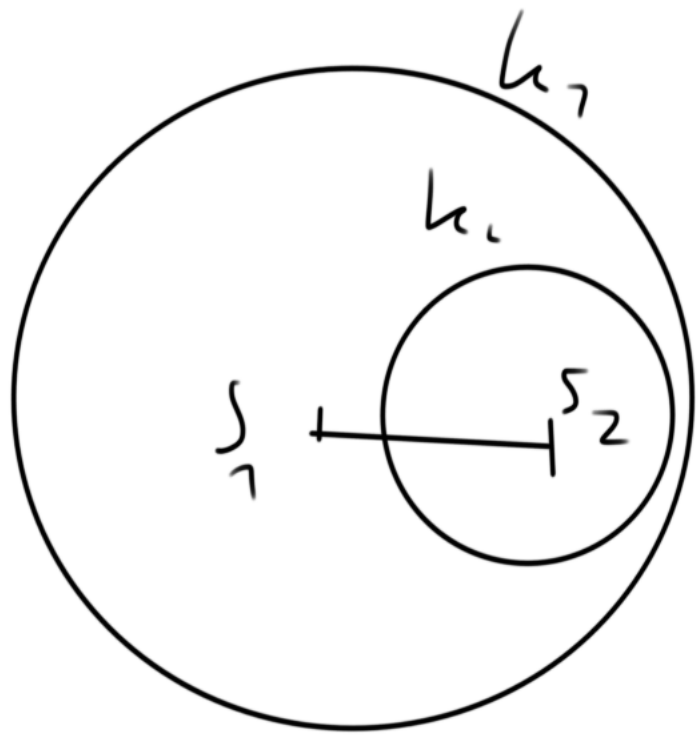


vnitřní dotyk

$k_1 \cap k_2 = \{T\}$

$v = r_1 - r_2$

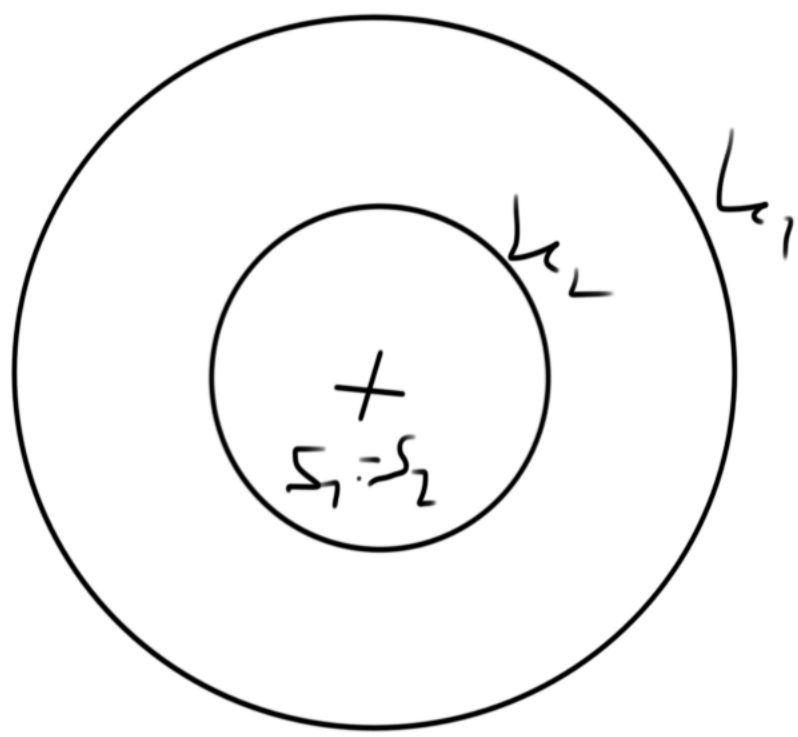
v)



$0 < v < r_1 - r_2$

$k_1 \cap k_2 = \{\}$

vi)

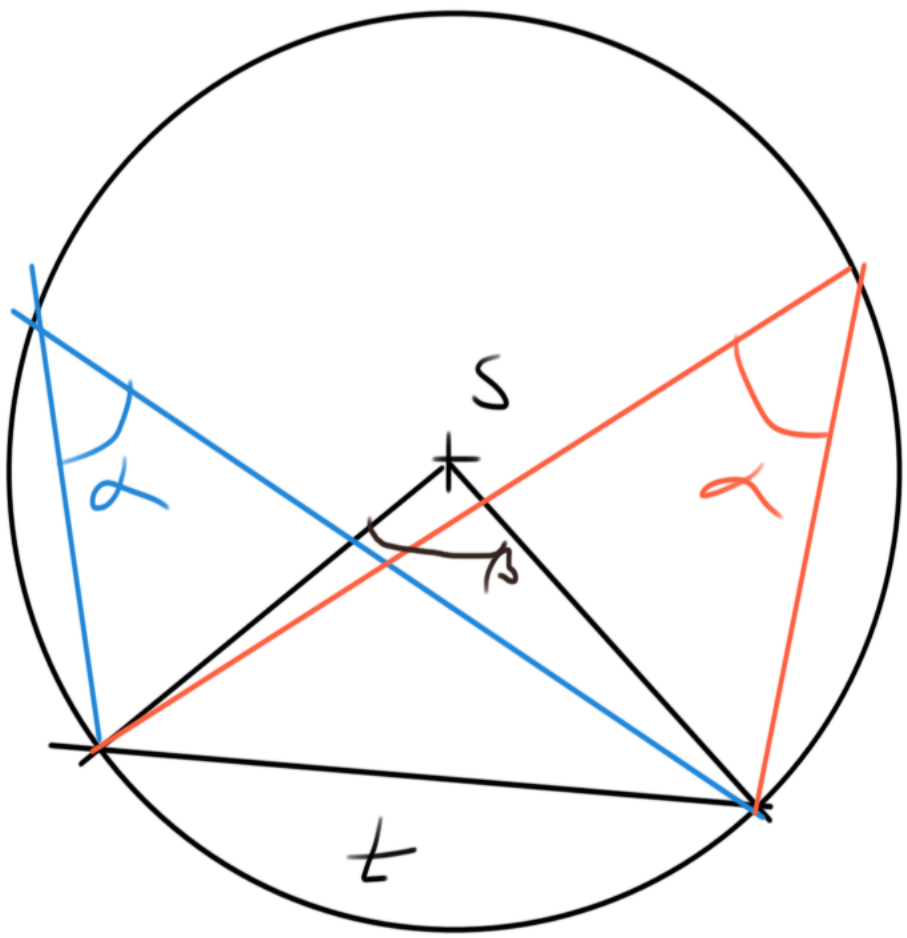


$k_1 \cap k_2 = \emptyset$

$v = 0$

koncentrické kružnice

10.4.4. Úhly v kružnici

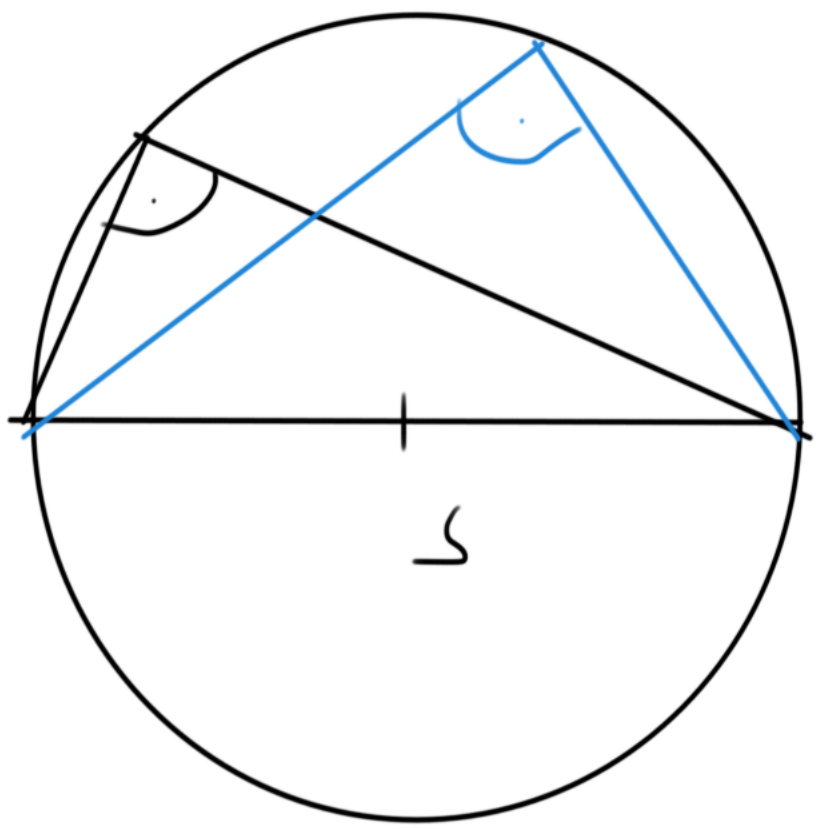


α .. obvodový

$\alpha = \alpha$

β .. středový

$\beta = 2\alpha$



$\beta = 180°$

Thaletova kružnice

10.5 Geometrická zobrazení v rovině

Geometrické zobrazení:

$$X \text{ v rovině} \longrightarrow X' \text{ v rovině}$$

X: $x' = x$ $\quad x \ldots$ samodružný

shodná
podobná

Shodná' Labr.

- zachovávají vzdál. $X, Y \in \mathbb{R}^2$
  $X', Y' \in \mathbb{R}^2$

$$|X'Y'| = |XY|$$

Vlastnosti shodnosti

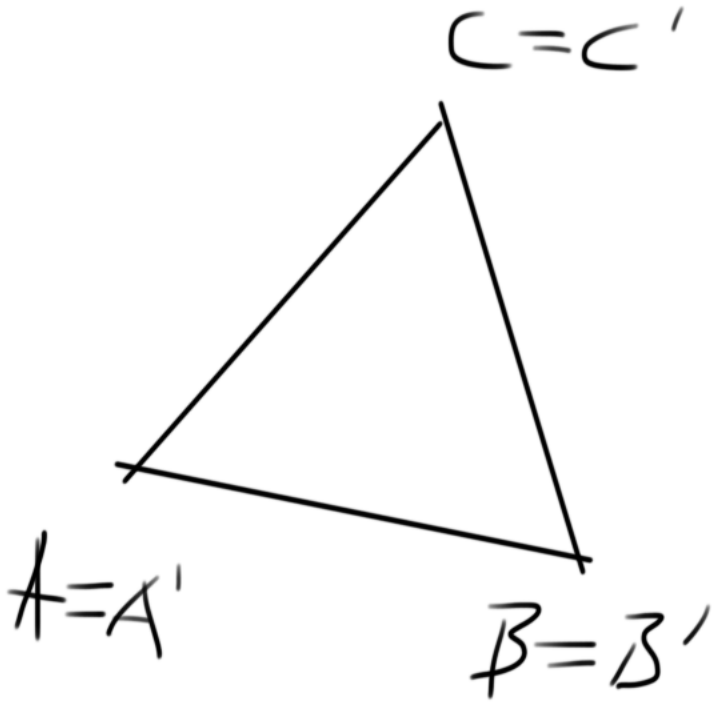
· obrazem přímky je úsečka stejné délky

· rovnoběžky ⟶ rovnoběžky

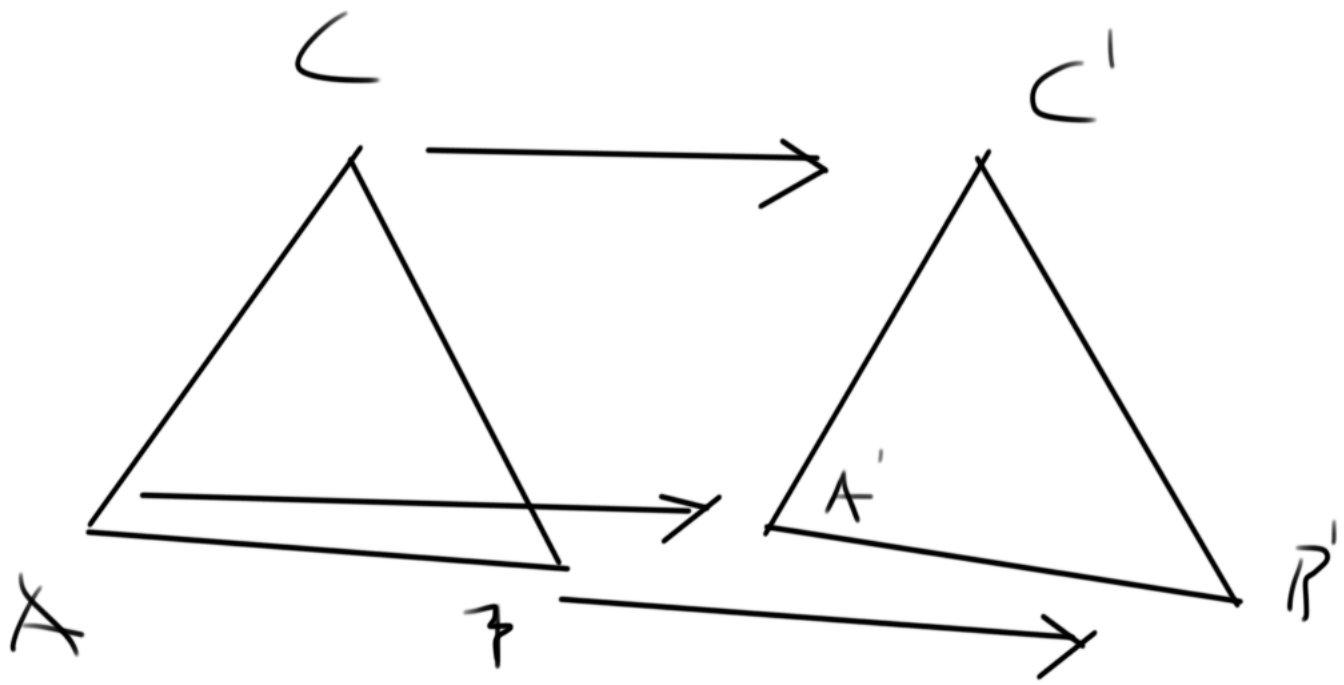
Shodnost — přímá
$\triangle ABC$ a $\triangle A'B'C'$ mají souhlasnou orientaci vrcholů
identita, posunutí, otočení, též souměrnost

— nepřímá: nesouhlasná orientace vrcholů

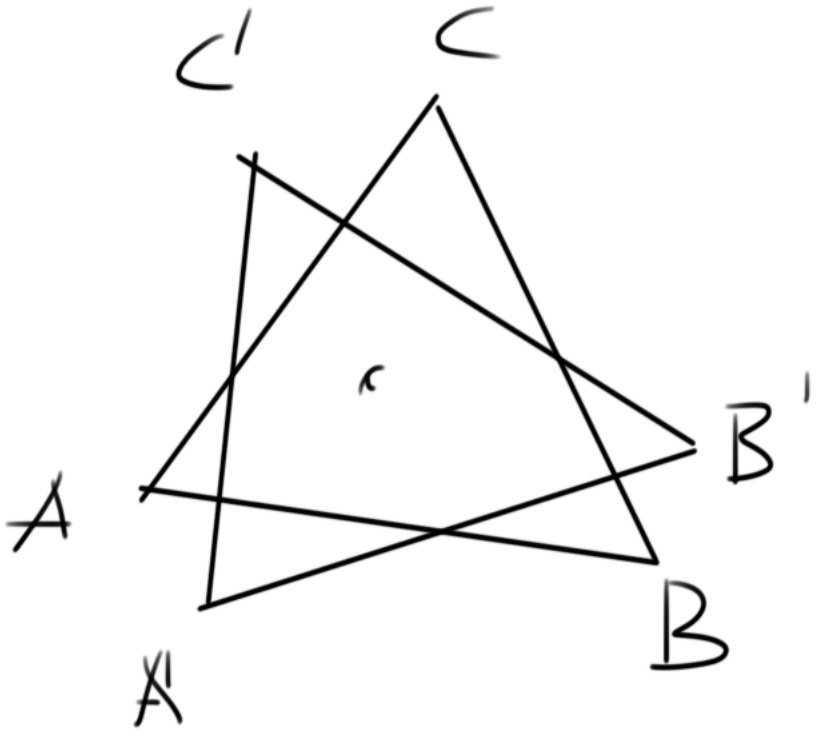
· osová souměrnost



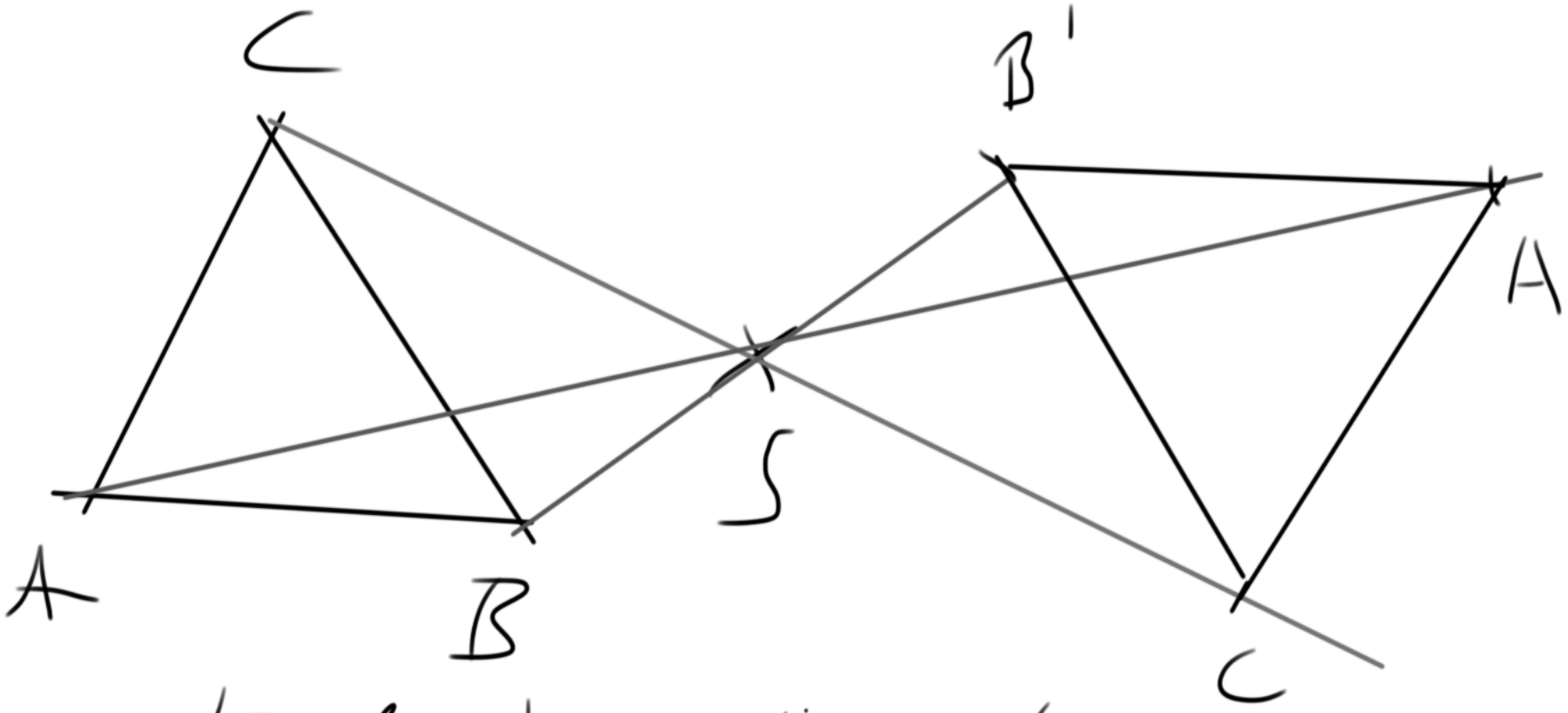
identita



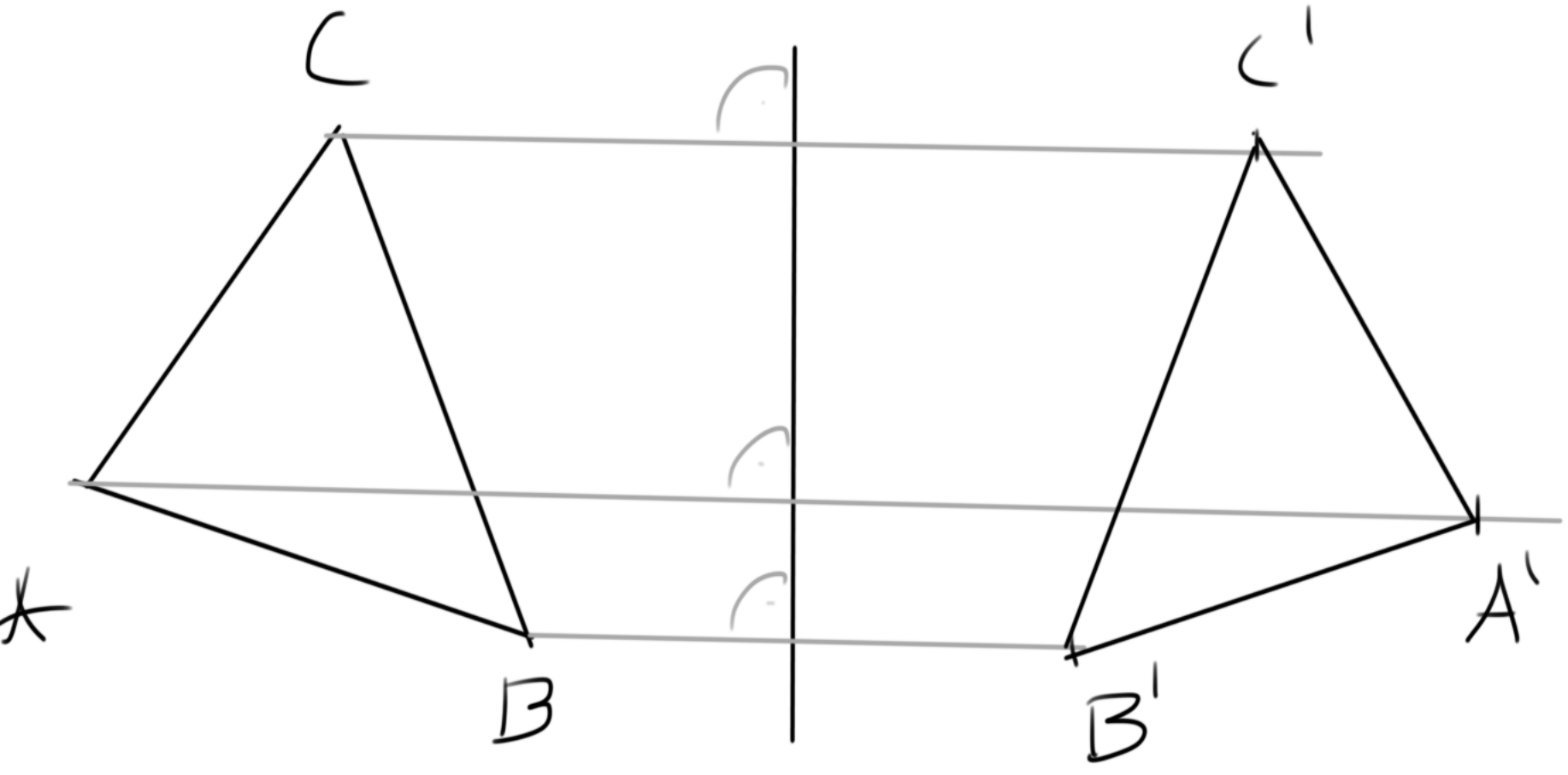
posunutí
translace



otáčení (rotace



středová souměrnost



osová souměrnost