$$\vec{u} = \left[-2\sqrt{2}\,,\ \sqrt{2}\,,\ -\sqrt{6}\right] \qquad \varphi = ?$$

$$\vec{v} = \left[-\sqrt{2}\,,\ \frac{\sqrt{2}}{2}\,,\ -\frac{\sqrt{6}}{2}\right]$$

$$\vec{u} \cdot \vec{v} = |\vec{u}| \cdot |\vec{v}| \cos\varphi \qquad \vec{u} = 2 \cdot \vec{v}$$

$$|\vec{u}|^2 = \vec{u} \cdot \vec{u} = 4 \cdot 2 + 2 + 6 = 16 \to |\vec{u}| = 4 \qquad \to \varphi = 0$$

$$|\vec{v}|^2 = 2 + \frac{1}{2} + \frac{6}{4} = 4 \longrightarrow |\vec{v}| = 2$$

$$\vec{u} \cdot \vec{v} = 2 \cdot 2 + \frac{2}{2} + \frac{6}{2} = 8$$

$$\cos\varphi = \frac{\vec{u} \cdot \vec{v}}{|\vec{u}| \cdot |\vec{v}|} = \frac{8}{4 \cdot 2} = 1 \longrightarrow \varphi = 0$$

$$\vec{u} = \left(0, -2, -2\sqrt{3}\right)$$

$$\vec{v} = \left(\sqrt{3}, \frac{1}{2}, \frac{\sqrt{3}}{2}\right)$$

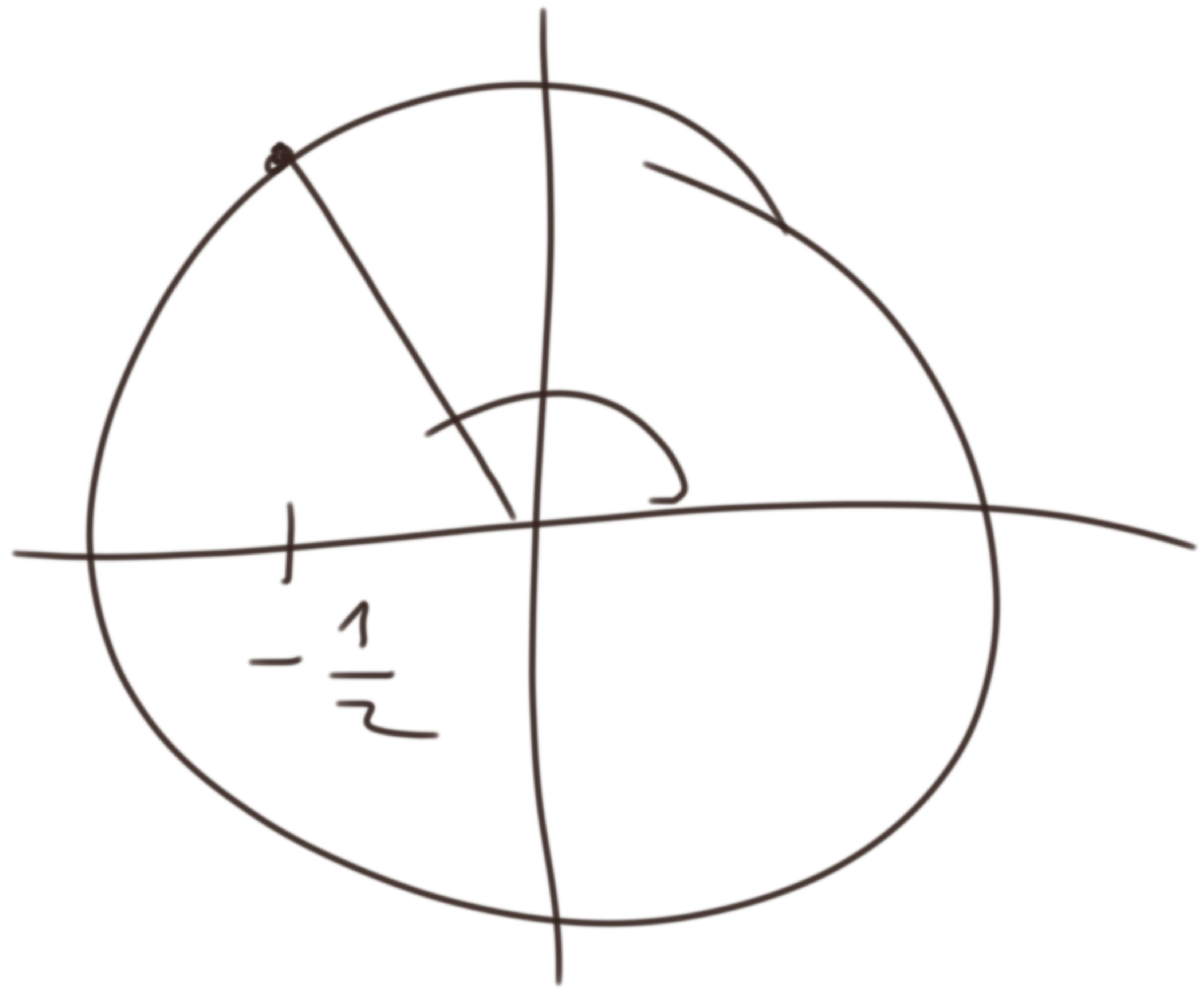
$$|\vec{u}|^2 = 4 + 12 = 16 \longrightarrow |\vec{u}| = 4$$

$$|\vec{v}|^2 = 3 + \frac{1}{4} + \frac{3}{4} \longrightarrow |\vec{v}| = 2$$

$$\vec{u} \cdot \vec{v} = 0 - 1 - 3 = -4$$

$$\cos\varphi = \frac{-4}{4 \cdot 2} = -\frac{1}{2}$$

$$\varphi = \frac{2\pi}{3}$$



$\vec{u} = (7, -1)$ Najděte $\vec{v}$ tak, aby

$$\underbrace{\vec{u} \parallel \vec{v}}_{\vec{v} = \alpha \vec{u} \quad \alpha \in \mathbb{R}} \wedge |\vec{v}| = 10$$

$$10 \overset{!}{=} |\vec{v}| = \alpha \cdot |\vec{u}| = \alpha \cdot \sqrt{49 + 1}$$

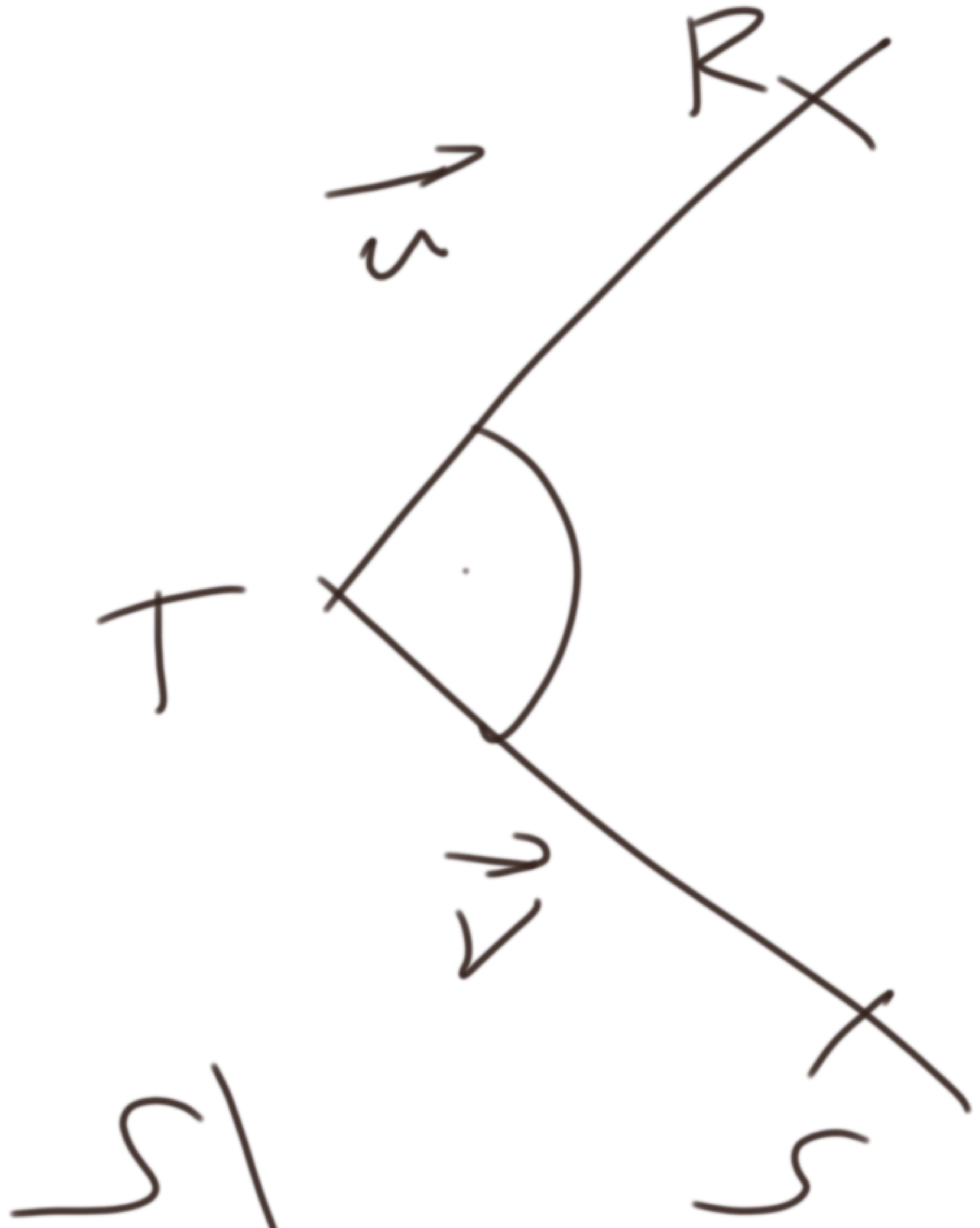
$$10 = \alpha \cdot \sqrt{50}$$

$$\alpha = \frac{10}{\sqrt{50}} = \frac{2}{\sqrt{2}} = \sqrt{2}$$

$$\sqrt{50} = \sqrt{2 \cdot 25} = 5 \cdot \sqrt{2}$$

Body $R=[3,1]$ $\quad S=[-1,3]$

$T=?$ $\quad |\sphericalangle RTS| = 90^\circ \wedge T \in x$



$\sphericalangle RTS$

$\vec u = \overrightarrow{TR}$ $\quad \vec v = \overrightarrow{TS}$

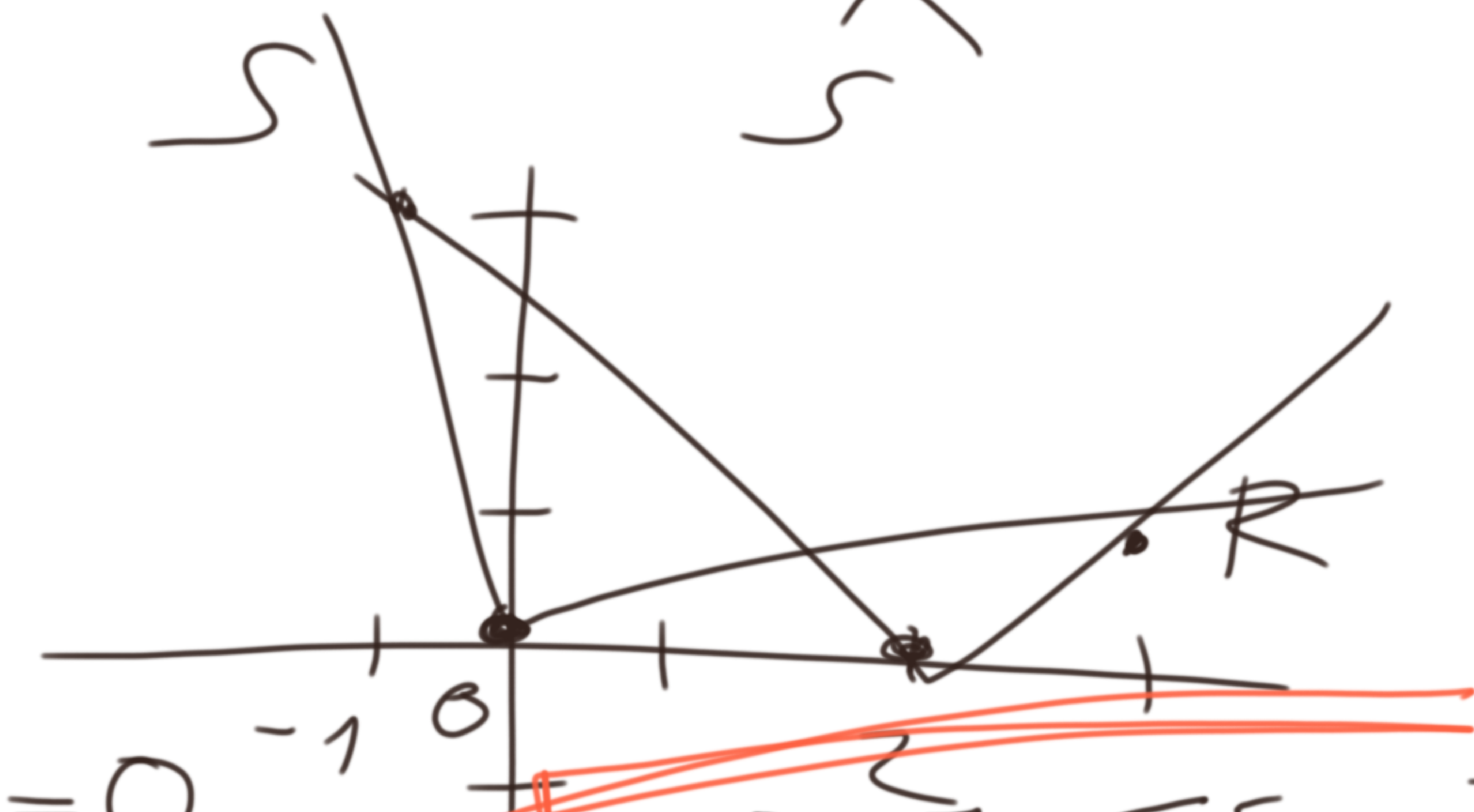
$T=[z, 0]$

$\vec u = (3-z, 1)$ $\quad \vec v = (-1-z, 3)$

$0 = \vec u \cdot \vec v = (3-z)\cdot(-1-z) + 1\cdot 3$

$= -3 - 3z + z + z^2 + 3$

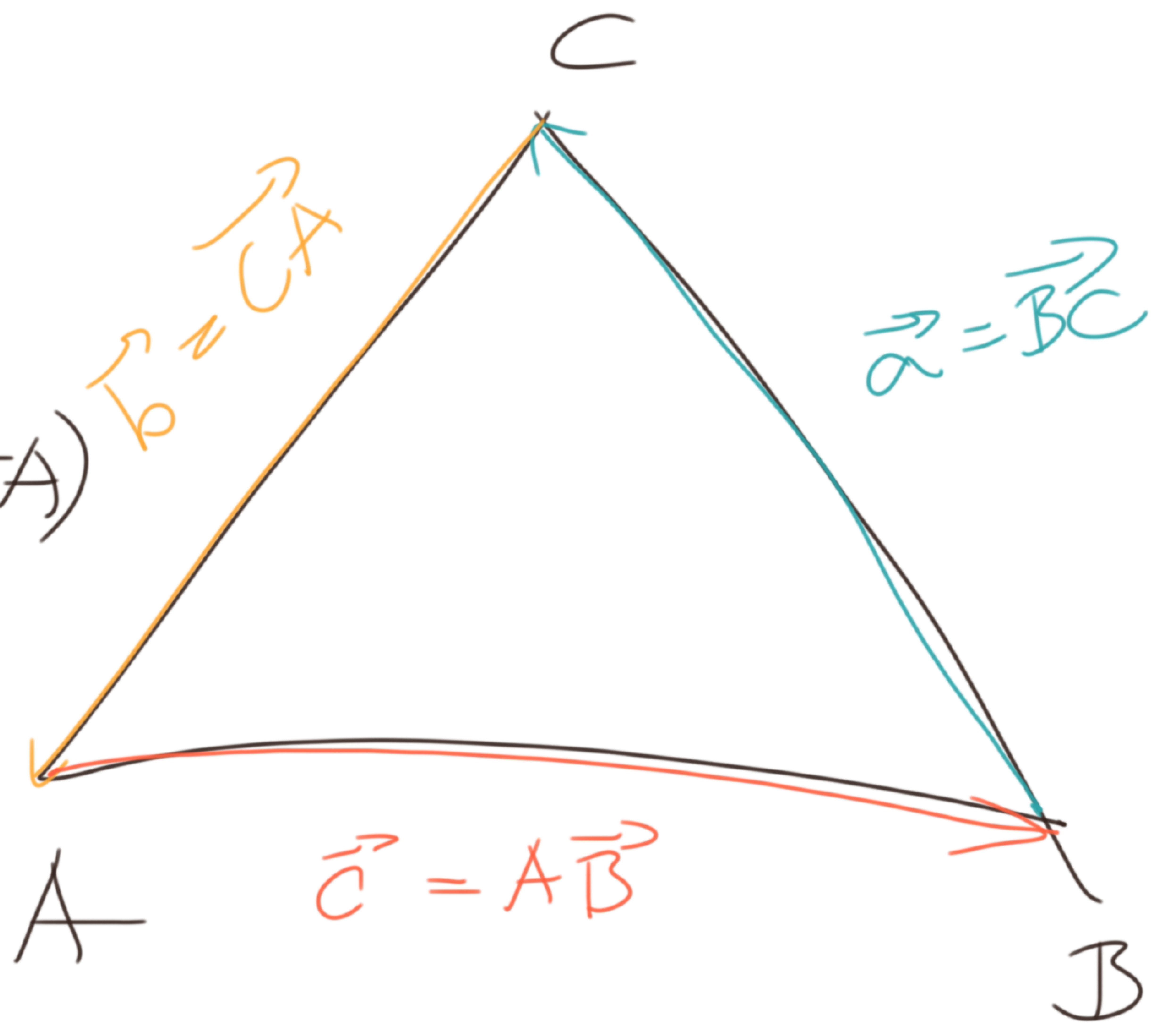
$0 = z^2 - 2z = (z-2)\cdot z$ $\quad z_1 = 0$, $\quad z_2 = 2$



$\boxed{T_1=[0,0] \quad T_2=[2,0]}$

$\triangle ABC$ $\quad \vec{a} = C - B$, $\vec{b} = A - C$, $\vec{c} = B - A$

Ukažte, že $\vec{a} + \vec{b} + \vec{c} = \vec{0}$



$$\vec{a} + \vec{b} + \vec{c} = (C - B) + (A - C) + (B - A)$$

$$= \vec{0}$$

$R = [3, -2]$ $S = [-4, 5]$ $T = [2, 1]$

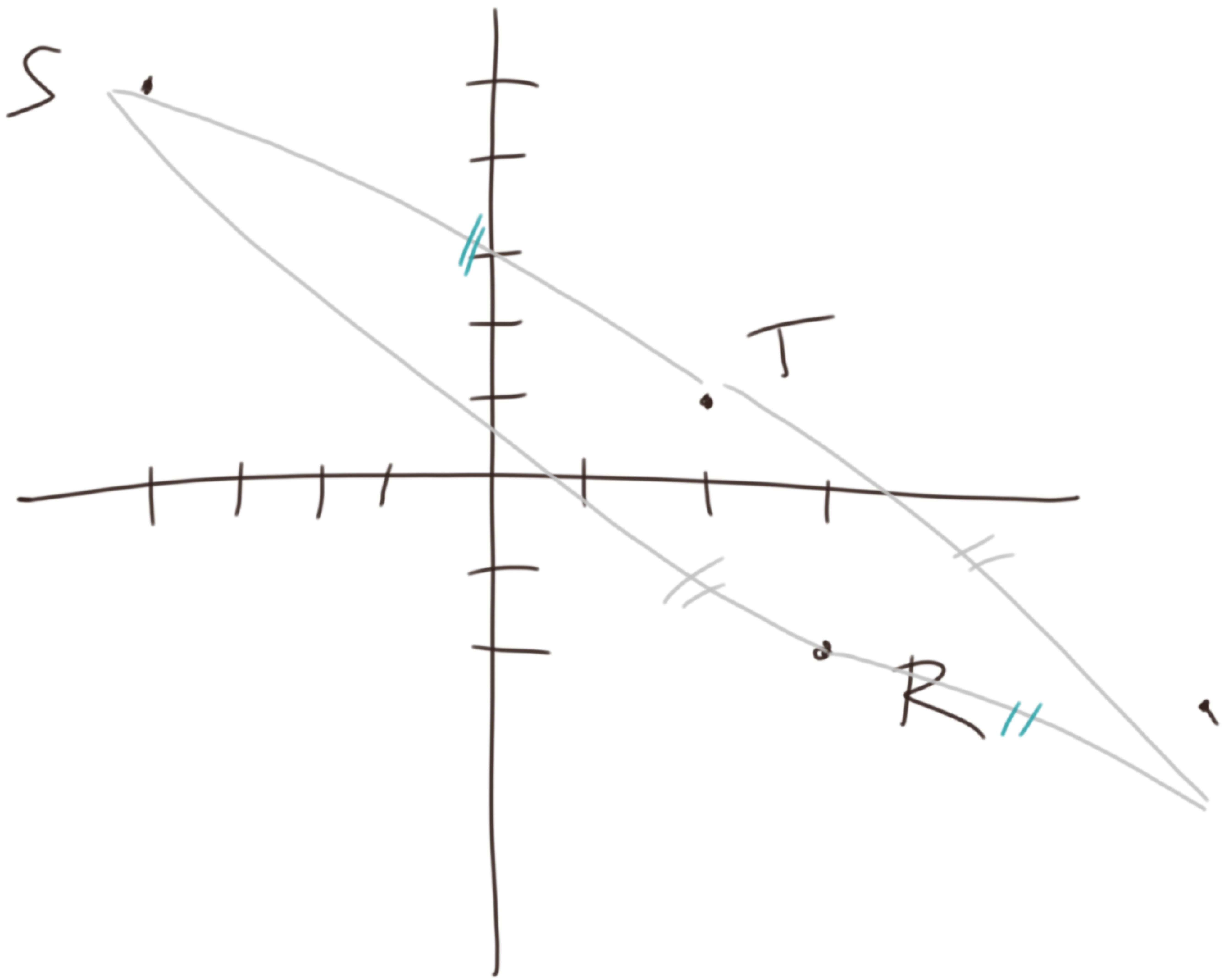
$X = ?$ RSTX je rovnoběžník

$\vec{u} = \overrightarrow{SR}$

$X = T + \vec{u}$

$\vec{u} = (7, -7)$

$X = T + \vec{u} = (9, -6)$



$$\vec{x}_1 = \begin{pmatrix} -1 \\ 4 \end{pmatrix} \qquad \vec{x}_2 = \begin{pmatrix} 1 \\ 1 \end{pmatrix} \qquad \vec{u} = \begin{pmatrix} -\frac{3}{2} \\ \frac{9}{2} \end{pmatrix}$$

Zapište $\vec{u}$ jako LK $\vec{x}_1$ a $\vec{x}_2$

$$\vec{u} = \alpha \cdot \vec{x}_1 + \beta \vec{x}_2$$

$$\begin{pmatrix} \frac{3}{2} \\ \frac{9}{2} \end{pmatrix} = \alpha \cdot \begin{pmatrix} -1 \\ 4 \end{pmatrix} + \beta \cdot \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$\left.\begin{aligned} -\alpha + \beta &= 3/2 \\ 4\alpha + \beta &= \frac{9}{2} \end{aligned}\right\} \ominus$$

$$5\alpha = \frac{6}{2}$$

$$\boxed{\alpha = \frac{3}{5}}$$

$$-\frac{3}{5} + \beta = \frac{3}{2} \qquad \beta = \frac{15+6}{10} = \boxed{\frac{21}{10}}$$