$A = (0, 0, -4)$

$B = (6, 0, -1)$ → PROJEKCIJA NA RAVNINU $z = -1$

$x_T = \frac{x_A + x_B}{2} = \frac{0+6}{2} = 3$

$y_T = \frac{y_A + y_B}{2} = \frac{0+0}{2} = 0$

$z_T = \frac{z_A + z_B}{2} = \frac{-4-1}{2} = -\frac{5}{2}$

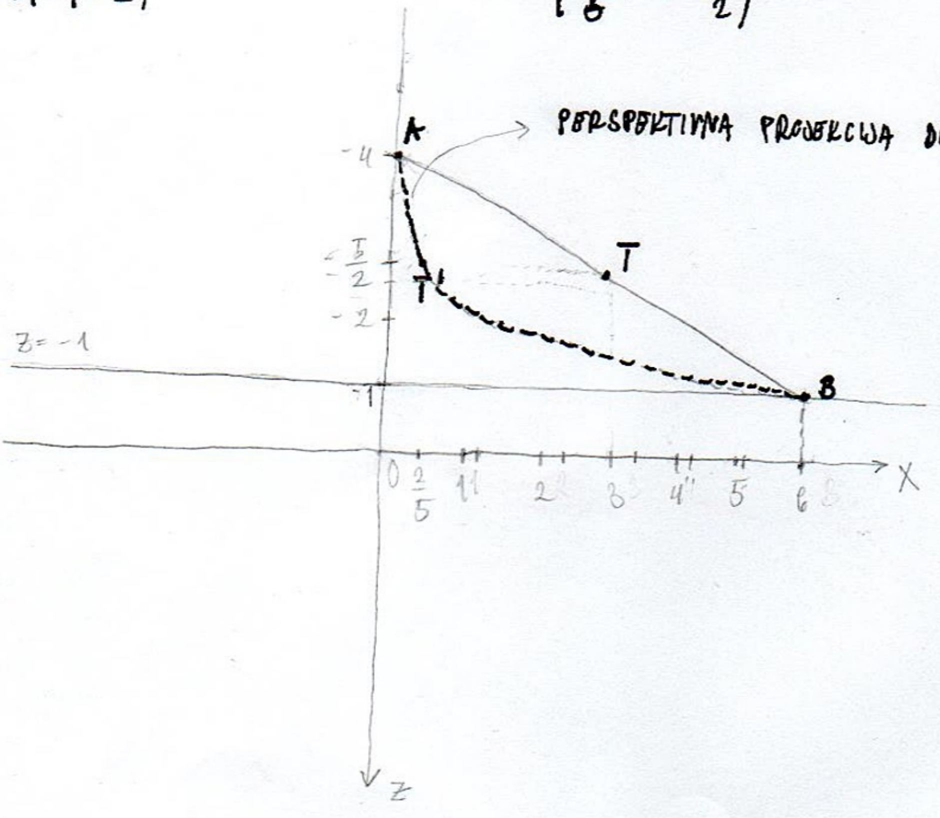
$T = (3, 0, -2)$

$x_T \longmapsto \frac{d}{z_T} = \frac{-1}{-\frac{5}{2}} = \frac{1}{\frac{5}{2}} = \frac{2}{5} = x_{T'}$

$y_T \longmapsto \frac{d}{z_T} \cdot y_T = -\frac{2}{5} \cdot 0 = 0 = y_{T'}$

$z_T \longmapsto z_T = -\frac{5}{2} = z_{T'}$

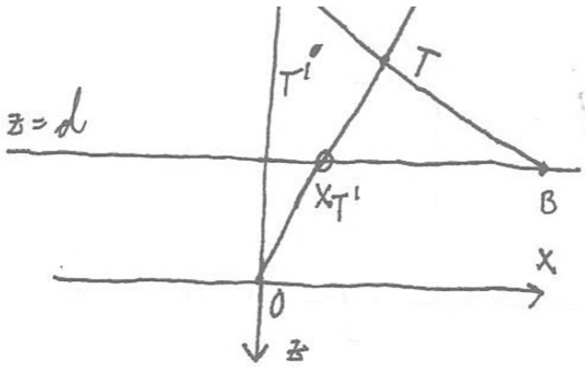
$T' = \left(\frac{2}{5}, 0, -\frac{5}{2}\right)$



$x \longmapsto \frac{d}{z}$

$y \longmapsto \frac{d}{z} y$

$z \longmapsto z$



$d = -1$

$A = (0, 0, -4)$

$B = (6, 0, 0)$

$A = A'$
$B = B'$ } PERSPEKTIVNE TRANSFORMACIJE

a) $C = \left(\overset{C_x}{\frac{12}{5}}, \overset{C_y}{0}, \overset{C_z}{-\frac{12}{5}} \right)$

$D = \left(\overset{D_x}{5}, \overset{D_y}{0}, \overset{D_z}{-\frac{2}{3}} \right)$

$C_x \longmapsto \frac{d}{C_z} = \frac{-1}{-\frac{12}{5}} = \frac{5}{12} = C'_x$

$C_y \longmapsto \frac{d}{C_z} \cdot C_y = \frac{5}{12} \cdot 0 = 0 = C'_y$

$C_z \longmapsto C_z = -\frac{12}{5} = C'_z$

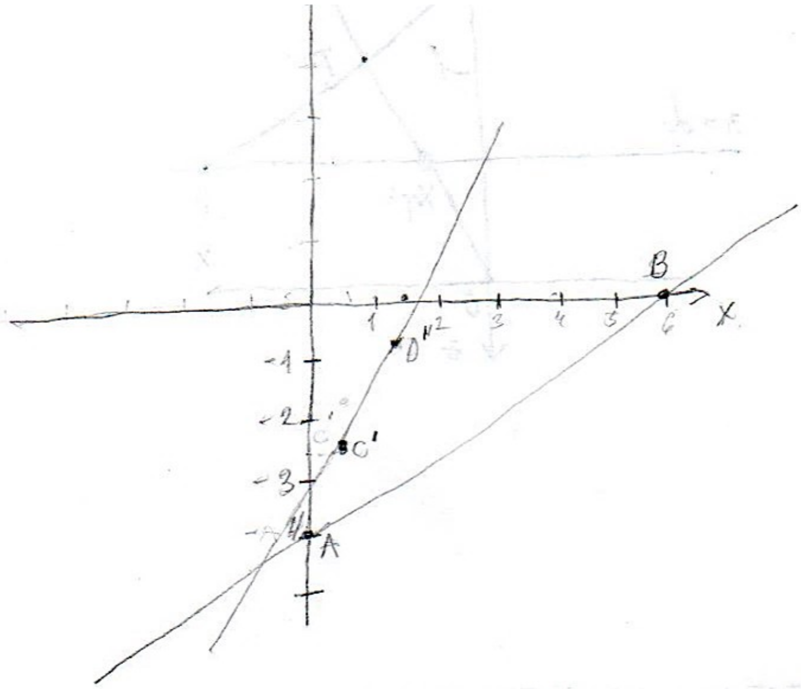
$$\boxed{C' = \left(\frac{5}{12}, 0, -\frac{12}{5} \right)}$$

$D_x \longmapsto \frac{d}{D_z} = \frac{-1}{-\frac{2}{3}} = \frac{3}{2} = D'_x$

$D_y \longmapsto \frac{d}{D_z} \cdot D_y = \frac{3}{2} \cdot 0 = 0 = D'_y$

$D_z \longmapsto D_z = -\frac{2}{3} = D'_z$

$$\boxed{D' = \left(\frac{3}{2}, 0, -\frac{2}{3} \right)}$$



DOKAZ:

Da ova dva pravca nisu paralelna možemo pokazati pomoću skalarnog produkta vektora koji leže na ovim pravcima $\vec{a} = \overrightarrow{D'C'}$ i $\vec{b} = \overrightarrow{BA}$. Ako su vektori paralelni, kut između njih je $0°$. Iz definicije skalarnog produkta dva vektora:
$\vec{a} \cdot \vec{b} = \|\vec{a}\| \cdot \|\vec{b}\| \cdot \underbrace{\cos\alpha}_{\cos 0° = 1}$ slijedi da će dva vektora biti paralelna ako vrijedi

$\vec{a} \cdot \vec{b} = \|\vec{a}\| \cdot \|\vec{b}\|$. Ako pokažemo da ovo ne vrijedi, pokazali smo da ta dva vektora nisu paralelna pa ni pravci na kojima oni leže.

$$\vec{a} = \overrightarrow{D'C'} = D' - C' = \left(\frac{3}{2}, 0, -\frac{2}{3}\right) - \left(\frac{5}{12}, 0, -\frac{12}{5}\right) = \left(\frac{13}{12}, 0, \frac{26}{15}\right)$$

$$\|\vec{a}\| = \sqrt{\left(\frac{13}{12}\right)^2 + 0^2 + \left(\frac{26}{15}\right)^2} = \frac{13\sqrt{89}}{60}$$

$$\vec{b} = \overrightarrow{BA} = B - A = (6, 0, 0) - (0, 0, -4) = (6, 0, 4)$$

$$\|\vec{b}\| = \sqrt{6^2 + 0^2 + 4^2} = 2\sqrt{13}$$

$$\vec{a} \cdot \vec{b} = \frac{13}{12} \cdot 6 + 0 \cdot 0 + \frac{26}{15} \cdot 4 \approx 13.43$$

$$\|\vec{a}\| \cdot \|\vec{b}\| = \frac{13\sqrt{89}}{60} \cdot 2\sqrt{13} \approx 14.74$$

$\neq \Rightarrow$ Pravci nisu paralelni