Zadatak 6. Zraka svjetlosti ima smjer određen pravcem $x-2y+5=0$. Odredi pravac na kojem je reflektirana zraka nakon odbijanja od pravca $3x-2y+7=0$.

Rješenje.

z (zraka) $\ldots\ x-2y+5=0$

p (pravac) $\ldots\ 3x-2y+7=0$

$$2y=x+5$$

$$2y=3x+7$$

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

$$y=\frac{3}{2}x+\frac{7}{2}$$

$$\{T\}=z\cap p$$

$$\frac{1}{2}x+\frac{5}{2}=\frac{3}{2}x+\frac{7}{2}\quad /\cdot 2$$

$$x+5=3x+7$$

$$2x=-2$$

$$x=-1$$

$$y=\frac{1}{2}\cdot(-1)+\frac{5}{2}$$

$$y=2$$

$$\operatorname{tg}\varphi == \left|\frac{k_2-k_1}{1+k_1k_2}\right| = \left|\frac{\frac{1}{2}-\frac{3}{2}}{1+\frac{3}{2}\cdot\frac{1}{2}}\right| = \left|\frac{-1}{\frac{7}{4}}\right| = \frac{4}{7}$$

$$\varphi=\sphericalangle(z,p)=\sphericalangle(z',p)$$

$$\operatorname{tg}\varphi=\frac{4}{7}=\left|\frac{k_{z'}-k_1}{1+k_1k_{z'}}\right| = \left|\frac{k_{z'}-\frac{3}{2}}{1+\frac{3}{2}\cdot k_{z'}}\right| = \left|\frac{\frac{2k_{z'}-3}{2}}{\frac{2+3k_{z'}}{2}}\right| = \frac{|2k_{z'}-3|}{|2+3k_{z'}|}$$

$$\frac{|2k_{z'}-3|}{|2+3k_{z'}|}=\frac{4}{7}$$

$$7|2k_{z'}-3|=4|2+3k_{z'}|$$

$$2k_{z'}-3<0 \implies k_{z'}<\frac{3}{2}$$

$$2+3k_{z'}<0 \implies k_{z'}<-\frac{2}{3}$$

$k_{z'}\in\left\langle -\frac{2}{3},\frac{3}{2}\right\rangle$

$$-7(2k_{z'}-3)=4(2+3k_{z'})$$

$$-14k_{z'}+21=8+12k_{z'}$$

$$26k_{z'}=13$$

$k_{z'}=\frac{1}{2}$ (koeficijent od z)

$k_{z'}\in\left\langle -\infty,-\frac{2}{3}\right\rangle\cup\left\langle\frac{3}{2},\infty\right\rangle$

$$7(2k_{z'}-3)=4(2+3k_{z'})$$

$$14k_{z'}-21=8+12k_{z'}$$

$$2k_{z'}=29$$

$k_{z'}=\frac{29}{2}$

z' prolazi točkom $T(-1,2)$ i ima koeficijent smjera $k_{z'} = \frac{29}{2}$:

$$y - 2 = \frac{29}{2}(x+1) \quad / \cdot 2$$

$$2y - 4 = 29x + 29$$

$$\boxed{29x - 2y + 33 = 0}$$