Zadatak 36. Na pravcima $y = 4x - 8$ i $y = -2x + 9$ dvije su visine trokuta ABC. Ako je $A(-3, 1)$, odredi vrhove B i C trokuta.

Rješenje.

$$
\begin{aligned}
v_b \quad &\ldots\ y = 4x - 8\\
v_c \quad &\ldots\ y = -2x + 9\\
&\quad\ \underline{A(-3,1)}\\
&\quad\ B,\ \ C = ?\\
\{H\} = v_b \cap v_c \quad &\ldots\ 4x - 8 = -2 + 9\\
&\quad\ 6x = 17\\
&\quad\ \boxed{x = \frac{17}{6}}\\
&\quad\ y = 4 \cdot \frac{17}{6} - 8\\
&\quad\ \boxed{y = \frac{10}{3}} \implies \boxed{H\left(\frac{17}{6}, \frac{10}{3}\right)}\\
v_a = H \quad &\ldots\ y - 1 = \frac{\frac{10}{3} - 1}{\frac{17}{6} + 3}(x + 3)\\
&\quad\ y - 1 = \frac{\frac{7}{3}}{\frac{35}{6}}(x + 3)\\
&\quad\ y - 1 = \frac{2}{5}(x + 3)\\
&\quad\ y = \frac{2}{5}x + \frac{11}{5}\\
a \perp v_a \implies k_a &= -\frac{1}{k_{v_a}} = -\frac{5}{2}\\
b \perp v_b \implies k_b &= -\frac{1}{k_{v_b}} = -\frac{1}{4}\\
c \perp v_c \implies k_c &= -\frac{1}{k_{v_c}} = \frac{1}{2}\\
A \in b \implies y - 1 &= -\frac{1}{4}(x + 3)\\
&\quad\ y = -\frac{1}{4}x + \frac{1}{4}\\
A \in c \implies y - 1 &= \frac{1}{2}(x + 3)\\
&\quad\ y = \frac{1}{2}x + \frac{5}{2}\\
\{B\} = v_b \cap c \quad &\ldots\ 4x - 8 = \frac{1}{2}x + \frac{5}{2} \quad / \cdot 2\\
&\quad\ 8x - 16 = x + 5
\end{aligned}
$$

$$7x = 21$$

$$\boxed{x = 3}$$

$$y = 4 \cdot 3 - 8$$

$$\boxed{y = 4} \implies \boxed{B(3, 4)}$$

$$\{C\} = v_c \cap b \quad \ldots \quad -2x + 9 = -\frac{1}{4}x + \frac{1}{4} \quad / \cdot 4$$

$$-8x + 16 = -x + 1$$

$$-7x = -35$$

$$\boxed{x = 5}$$

$$y = -2 \cdot 5 + 9$$

$$\boxed{y = -1} \implies \boxed{C(5, -1)}$$