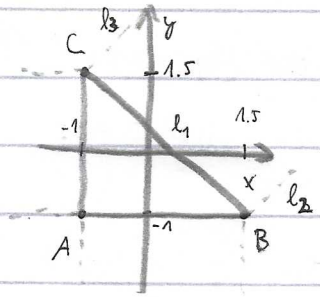
A B C

III) Triangle with vertices $(-1,-1)$, $(1.5,-1)$, $(-1,1.5)$



Get equation for line that passes through B and C:

slope: $L = \frac{-2.5}{2.5} = -1$ $\quad -1 = -1 \cdot (1.5) + n \Rightarrow n = 0.5$

l_1: $y = -x + 0.5$

$$\text{proj}_{l_1}(\vec{v}) = \vec{r}_B + \frac{(\vec{v} - \vec{r}_B) \cdot \vec{BC}}{\|\vec{BC}\|^2} \cdot \vec{BC}$$

Get equation for line that is orthogonal to l_1 and passes through Q:

slope $L = 1$ $\quad -1 = 1.5 + n \Rightarrow n = -2.5$

l_2: $y = x - 2.5$

Get equation for line that is orthogonal to l_1 and passes through C:

slope $L = 1$ $\quad 1.5 = -1 + n \Rightarrow n = 2.5$

l_3: $y = x + 2.5$

$$\pi_L(x,y) = \begin{cases} (-1,1.5) & \text{if } y > 1.5 \wedge y > x + 2.5, \\ \text{proj}_{l_1}\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) & \text{if } y \geq x - 2.5 \wedge y \leq x + 2.5 \wedge y > -x + 0.5, \\ (1.5,-1) & \text{if } y < x - 2.5 \wedge x > 1.5, \\ (x,-1) & \text{if } -1 \leq x \leq 1.5 \wedge y \leq -1, \\ (-1,-1) & \text{if } x < -1 \wedge y < -1, \\ (-1,y) & \text{if } -1 \leq y \leq 1.5 \wedge x < -1, \\ (x,y) & \text{otherwise} \end{cases}$$

Simpler version:

$$\pi_L(x,y) = \begin{cases} \text{proj}_{l_1}\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) & \text{if } y \geq x - 2.5 \wedge y \leq x + 2.5 \wedge y > -x + 0.5 \\ \left(\min(\max(x,-1), 1.5),\ \min(\max(y,-1), 1.5)\right), & \text{otherwise} \end{cases}$$