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1a. P is orthogonal to the orthogonal vector to L_1 and L_2.

$$\vec{n} = \vec{V_{l_1}} \times \vec{V_{l_2}} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 1 & 2 \\ 2 & 0 & -1 \end{vmatrix}$$

$$= ((1)(-1) - (2)(0))\hat{i} - ((0)(-1) - (2)(2))\hat{j} + ((0)(0) - (1)(2))\hat{k}$$
$$= (-1 - 0)\hat{i} - (0 - 4)\hat{j} + (0 - 2)\hat{k}$$
$$= -1\hat{i} + 4\hat{j} - 2\hat{k} \qquad \vec{n} = \begin{bmatrix} -1 \\ 4 \\ -2 \end{bmatrix}$$

Point in P: (5, 2, 0)

$$P \Rightarrow -1(x-5) + 4(y-2) - 2(z-0) = 0$$
$$-x + 5 + 4y - 8 - 2z = 0$$
$$-x + 4y - 2z - 3 = 0$$

b. $P_p = (5, 2, 0)$ $P_{L2} = (3, 0, 1)$

$\cancel{\text{proj}_{P_{L2}} P_p = \frac{P_p \cdot P_{L2}}{}}$ $V_p = \begin{bmatrix} 5 \\ 2 \\ 0 \end{bmatrix}$ $V_{L2} = \begin{bmatrix} 3 \\ 0 \\ 1 \end{bmatrix}$

$$\text{proj}_{V_{L2}} V_p = \frac{V_{L2} \cdot V_p}{\|V_p\|^2} V_p$$

$$V_{L2} \cdot V_p = 5 \cdot 3 + 2 \cdot 0 + 0 \cdot 1 = 15 + 0 + 0 = 15$$
$$|V_p| = \sqrt{5^2 + 2^2} = \sqrt{}$$

$\cancel{|V_{L2}| = \sqrt{3^2+1^2} = \sqrt{10}}$

$$\text{proj}_{V_{L2}} V_p = \frac{15}{\cancel{10}} V_p = \cancel{\begin{bmatrix} 75/29 \\ 30/29 \\ 0 \end{bmatrix}} = \frac{3}{2} V_p = \begin{bmatrix} 7.5 \\ 3 \\ 0 \end{bmatrix}$$

4.5
×4.5
225
2250
24.75

$$D = \cancel{\sqrt{(75/29 - 3)^2 + (30/29)}} = \sqrt{(7.5-3)^2 + (3-2)^2 + (0-0)^2} = \sqrt{4.5^2 + 1^2}$$

$$D = \sqrt{25.75}$$