

(a) \vec{v}_r $\vec{P}_r \vec{P}$ P_r $\vec{v}_r(2, 3, -1)$
 $\vec{P}_r(0, 2, -1)$
 $\vec{P}_r \vec{P}(0, -3, 3)$

$$\pi \equiv \begin{vmatrix} 2 & 0 & x \\ 3 & -3 & y-2 \\ -1 & 3 & z+1 \end{vmatrix} = 0$$

$$-6(z+1) + 9x - 3x - 6(y-2) = 0$$

$$-6z - 6 + 9x - 3x - 6y + 12 = 0$$

$$6x - 6y - 6z + 6 = 0$$

$$\boxed{x - y - z + 1 = 0} \equiv \pi$$

(b) $\mathcal{H}\left(\frac{1-1}{2}, \frac{0-2}{2}, \frac{-1-1}{2}\right) = \mathcal{H}(0, -1, -1)$

$$\boxed{S \equiv (x, y, z) = (0, -1, -1) + (1, -1, -1)t; t \in \mathbb{R}}$$

$$\vec{n}_\pi(1, -1, -1)$$