

$$b) \vec{v}_r = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 2 & -1 \\ -1 & 1 & -3 \end{vmatrix} = (-5, 4, 3) \quad R(-1, 1, 0)$$

$$\vec{v}_s = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 1 & 0 \\ 3 & 2 & 1 \end{vmatrix} = (1, -1, -1) \quad S(-1, 1, 0)$$

$$\Pi: \begin{vmatrix} x+1 & y-1 & z \\ -5 & 4 & 3 \\ 1 & -1 & -1 \end{vmatrix} = 0 \Rightarrow \begin{aligned} -1(x+1) - 2(y-1) + z &= 0 \\ -x - 2y + z + 1 &= 0 \end{aligned}$$

$$\boxed{\Pi: x + 2y - z - 1 = 0}$$

$$(3) r \perp \Pi \quad \vec{n}(3, 2, 1) = \vec{v}_r \quad r: \frac{x+2}{3} = \frac{y}{2} = \frac{z-2}{1} \quad \begin{cases} 2x+4=3y \\ y=2z-4 \end{cases} \begin{cases} 2x-3y+4=0 \\ y-2z+4=0 \end{cases}$$

$$a) \left(\begin{array}{ccc|c} 2 & -3 & 0 & 4 \\ 0 & 1 & -2 & 4 \\ 2 & -1 & -3 & 0 \\ 1 & 0 & -1 & -10 \end{array} \right)$$

$$|A| = -6 + 12 - 4 = 2 \neq 0 \quad \text{vs } A = 3$$

$$|A^*| = \begin{vmatrix} 2 & 0 & -6 & 16 \\ 0 & 1 & -2 & 4 \\ 2 & 0 & -5 & 4 \\ 1 & 0 & -1 & -10 \end{vmatrix} = \begin{vmatrix} 2 & -6 & 16 \\ 2 & -5 & 4 \\ 1 & -1 & -10 \end{vmatrix} \neq 0 \quad \text{vs } A = 4$$

Se cruzan.

$$b) \text{ Continue a } r: \vec{v}_r, P, \text{ ll a } s \quad \vec{v}_s = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 2 & 1 & -3 \\ 1 & 0 & -1 \end{vmatrix} = (1, -1, 1) \quad S(10, 20, 0)$$

$$\Pi \begin{vmatrix} x+2 & y & z-2 \\ 3 & 2 & 1 \\ 1 & -1 & 1 \end{vmatrix} = 0 \Rightarrow 3(x+2) - 2y - 5(z-2) = 0$$

$$\Pi: 3x - 2y - 5z + 16 = 0$$

$$c) \vec{v}_r \times \vec{v}_s = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 3 & 2 & 1 \\ 1 & -1 & 1 \end{vmatrix} = (3, -2, -5)$$

$$\Pi_1: \begin{vmatrix} x+2 & y & z-2 \\ 3 & 2 & 1 \\ 3 & -2 & -5 \end{vmatrix} = 0 \Rightarrow \begin{aligned} -8(x+2) + 18y - 12(z-2) &= 0 \\ -8x + 18y - 12z + 8 &= 0 \end{aligned}$$

$$\boxed{\Pi_1: 4x - 9y + 6z - 4 = 0}$$

$$\Pi_2: \begin{vmatrix} x-10 & y-20 & z \\ 1 & -1 & 1 \\ 3 & -2 & -5 \end{vmatrix} = 0 \Rightarrow 7(x-10) + 8(y-20) + z = 0$$

$$\Pi_2: 7x + 8y + z - 230 = 0$$

$$t: \begin{cases} 4x - 9y + 6z - 4 = 0 \\ 7x + 8y + z - 230 = 0 \end{cases}$$

$$(4) r: x-3 = y = \frac{z-3}{-2} \quad R(3, 0, 3)$$

$$a) \vec{AR} = (3, -3, 4) \quad \Pi: \begin{vmatrix} x & y-3 & z+1 \\ 3 & -3 & 4 \\ 1 & 1 & -2 \end{vmatrix} = 0 \quad \begin{aligned} 2x + 10(y-3) + 6(z+1) &= 0 \\ 2x + 10y + 6z - 24 &= 0 \end{aligned}$$

$$\boxed{\Pi: x + 5y + 3z - 12 = 0}$$

$$b) \vec{n}(2, -2, 3) = \vec{v}_s$$

$$S = \begin{cases} x = 2\lambda \\ y = 3 - 2\lambda \\ z = -1 + 3\lambda \end{cases}$$

$$\frac{x}{2} = \frac{y-3}{-2} = \frac{z+1}{3}$$