

5) a) Write an equation of the line L of intersection of the planes

$$\pi_1: 4x + y + z = 0 \text{ and } \pi_2: 2x + 3y - 2z + 5 = 0.$$

$$\vec{v} \parallel (\vec{n}_1 \times \vec{n}_2) = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 4 & 1 & 1 \\ 2 & 3 & -2 \end{vmatrix} = (-5, +10, 10) = -5(1, -2, -2)$$

$$P_0 = \pi_1 \cap \pi_2 : \begin{cases} 4x + y + z = 0 \\ 2x + 3y - 2z = -5 \end{cases}$$

$$x=0 \Rightarrow y=-1, z=1$$

$$P_0(0, -1, 1) \text{ (which is not unique)}$$

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

b) Write the equation of the plane passing through the point $P(1, -2, 9)$ which is perpendicular to the line L in part a).

$$\vec{n} \parallel \vec{v}, \quad \pi: (x-1, y+2, z-9) \cdot (1, -2, -2) = 0$$

$$\pi: x - 2y - 2z + 13 = 0$$