

LDDR - Niveau 1 : T F 11 GEOMETRIE 3D

EXERCICE 1

$$1) \begin{pmatrix} 5 \\ -3 \\ 2 \\ 5 \\ -3 \end{pmatrix} \wedge \begin{pmatrix} 7 \\ 2 \\ -1 \\ 7 \\ 2 \end{pmatrix} = \begin{pmatrix} -1 \\ 19 \\ 31 \end{pmatrix}$$

$$2) \begin{pmatrix} m \\ -m \\ 5 \end{pmatrix} \cdot \begin{pmatrix} 0 \\ 2m \\ 40 \end{pmatrix} = 0 \Rightarrow -2m^2 + 200 = 0 \Rightarrow 2m^2 = 200 \Rightarrow m^2 = 100 \Rightarrow m = \pm 10$$

EXERCICE 2

$$\Pi: 2x - y + 2z - 10 = 0$$

$$1) \text{ point: } y = z = 0 \quad 2x = 10 \Rightarrow x = 5 \quad A(5, 0, 0)$$

$\vec{v} \parallel \Pi \quad \vec{v} \perp \vec{n}_\Pi \Rightarrow \vec{v} \perp \begin{pmatrix} 2 \\ -1 \\ 2 \end{pmatrix} \Rightarrow \vec{v} = \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix}$ (il existe une infinité)

$$2) \text{dist}(O, \Pi) = \frac{|-10|}{\sqrt{4+1+4}} = \frac{10}{3}$$



$$\text{Soit } P(x, y, z) \in G$$

$$\text{dist}(P, \Pi) = 9 \Rightarrow \frac{|2x - y + 2z - 10|}{\sqrt{4+1+4}} = 9 \Rightarrow$$

$$\Rightarrow |2x - y + 2z - 10| = 27 \Rightarrow$$

$$G_1: 2x - y + 2z - 10 = 27 \Rightarrow G_1: 2x - y + 2z = 37$$

$$G_2: 2x - y + 2z - 10 = -27 \Rightarrow G_2: 2x - y + 2z = -17$$

EXERCICE 3

$$d: A(2; 6; 4) \quad B(2; -2; 10) \quad C(4; 0; 7)$$

$$1) \vec{AB} = \begin{pmatrix} 0 \\ -8 \\ 6 \end{pmatrix} \parallel \begin{pmatrix} 0 \\ 4 \\ 3 \end{pmatrix} \quad d: \begin{cases} x = 2 \\ y = 6 - 4\lambda \\ z = 4 + 3\lambda \end{cases}$$

$$T_P: y = 0 \Rightarrow 6 - 4\lambda = 0 \Rightarrow 4\lambda = 6 \Rightarrow \lambda = \frac{3}{2}$$

$$T_P(2; 0; \frac{17}{2})$$

$$2) \alpha \perp d \Rightarrow \vec{n}_\alpha = \begin{pmatrix} 0 \\ -4 \\ 3 \end{pmatrix} \quad -4y + 3z + d = 0$$

$C: 21 + d = 0 \Rightarrow d = -21$

$$\alpha: -4y + 3z - 21 = 0$$

$$3) \text{dist}(C, d) = \frac{\|\vec{d} \wedge \vec{AC}\|}{\|\vec{d}\|} = \frac{\sqrt{6^2 + 6^2 + 8^2}}{\sqrt{16+9}} = \frac{\sqrt{136}}{5}$$

$$\vec{AC} = \begin{pmatrix} 2 \\ -6 \\ 3 \end{pmatrix} \quad \vec{d} \wedge \vec{AC} = \begin{pmatrix} 0 \\ -4 \\ 3 \end{pmatrix} \wedge \begin{pmatrix} 2 \\ -6 \\ 3 \end{pmatrix} = \begin{pmatrix} 6 \\ 6 \\ 8 \end{pmatrix}$$

$\begin{matrix} 0 & 2 \\ -4 & -6 \end{matrix}$

$$41) \text{ Area} = \frac{1}{2} \|\vec{AB} \wedge \vec{AC}\| = \frac{1}{2} \left\| \begin{pmatrix} 1 \\ 2 \\ 16 \end{pmatrix} \right\| = \frac{\sqrt{544}}{2} = \sqrt{136}$$