5 Gennaio 2021 ore 10:30

Titolo nota 05/01/2021

Buongiorno!

Io ci sono. Fatevi sentire che arrivo subito...

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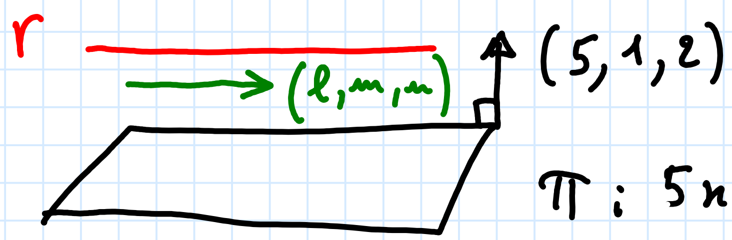
retta r passante per $A(1,0,0)$

parallela al piano $5x+y+2z=0 \leftarrow \pi$

e perpendicolare alla retta

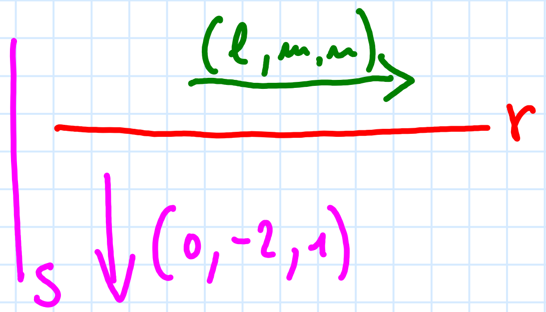
$s: x-1 = y+2z+5=0 \rightarrow \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 2 \end{bmatrix} \begin{matrix} \nearrow 0 \; l_s \\ \rightarrow -2 \; m_s \\ \searrow 1 \; n_s \end{matrix}$

$$r: \begin{cases} x = l \cdot t + 1 \\ y = m \cdot t + 0 \\ z = n \cdot t + 0 \end{cases} \qquad (l,m,n) \parallel r$$



$\pi: 5x+y+2z=0$

$$(l,m,n) \perp (5,1,2) \Rightarrow \begin{cases} 5l + 1m + 2n = 0 \\ 0 \cdot l - 2 \cdot m + 1 \cdot n = 0 \end{cases}$$



$n = 2 \cdot m$

$5l + m + 2 \cdot (2m) = 0$

$$l + m = 0$$

scelgo $l = 1$ e $m = -1$; $n = 2m = -2$

$$(l, m, n) = (1, -1, -2)$$

$$A(1, 0, 0) \qquad \boxed{t = -y}$$

$$\boxed{r: \begin{cases} x = t + 1 \\ y = -t \\ z = -2t \end{cases}} \longrightarrow \begin{cases} x = -y + 1 \\ z = 2y \end{cases} \qquad \boxed{r: \begin{cases} x + y - 1 = 0 \\ 2y - z = 0 \end{cases}}$$

$$x^2 + 4xy + y^2 - 2x - 4y - 2 = 0$$

$$A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix} ; \quad P_A(\lambda) = \dots = \lambda^2 - 2\lambda - 3 = (\lambda - 3) \cdot (\lambda + 1)$$

$$\lambda_1 = 3 \qquad \lambda_2 = -1$$

autovettori per $\lambda_1 = +3$

$$\begin{bmatrix} -2 & 2 \\ 2 & -2 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \qquad \boxed{x - y = 0} \qquad x = y$$

autosoluzione $(x, y) = (x, x) = x(1, 1) \quad \forall x \in \mathbb{R}$

autovettore $x(1, 1) \quad \forall x \in \mathbb{R} - \{0\}$

auto <u>VERSORE</u> $\frac{\sqrt{2}}{2}(1, 1) = \left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

$$\Lambda = \begin{bmatrix} 3 & 0 \\ 0 & -1 \end{bmatrix} ; \quad C = \begin{bmatrix} \frac{\sqrt{2}}{2} & -\frac{\sqrt{2}}{2} \\ \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2} \end{bmatrix} \qquad \det C = +1$$

rotazione

$$\begin{bmatrix}-2 & -4\end{bmatrix}\cdot\begin{bmatrix}\frac{\sqrt{2}}{2} & -\frac{\sqrt{2}}{2}\\ \frac{\sqrt{2}}{2} & \frac{\sqrt{2}}{2}\end{bmatrix}=\begin{bmatrix}-3\sqrt{2} & -\sqrt{2}\end{bmatrix}$$

45° antiorario

dopo la rotazione

$$\boxed{3(x')^2}\boxed{-1(y')^2}\boxed{-3\sqrt{2}\,x'}\boxed{-\sqrt{2}\,y'}-2=0$$

$$\boxed{3\cdot\left(x'-\frac{\sqrt{2}}{2}\right)^2-\frac{3}{2}}\boxed{-1\cdot\left(y'+\frac{\sqrt{2}}{2}\right)^2+\frac{1}{2}}-2=0$$

traslazione $\begin{cases} x''=x'-\frac{\sqrt{2}}{2}\\ y''=y'+\frac{\sqrt{2}}{2}\end{cases}$

$$3\cdot(x'')^2-\frac{3}{2}-(y'')^2+\frac{1}{2}-2=0$$

$$3\cdot(x'')^2-(y'')^2=\underbrace{2+\frac{3}{2}-\frac{1}{2}}_{3}$$

$$\boxed{\frac{(x'')^2}{1}-\frac{(y'')^2}{3}=+1}$$

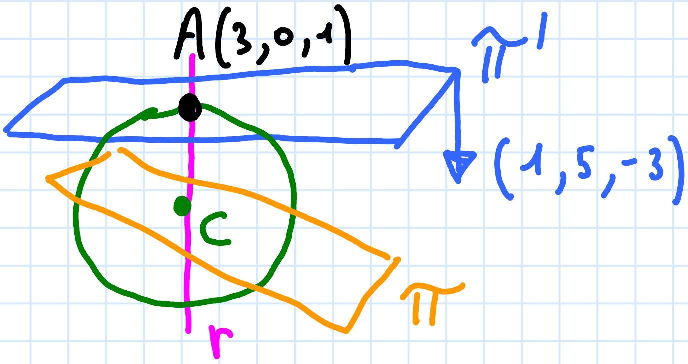
eq. canonica

IPERBOLE

<u>Sfera</u> $C \in$ piano $\pi : 2y+5=0$

↳ tangente a $\pi' : x+5y-3z=0$

nel punto $A(3,0,1) \in \pi'$



$$r : \begin{cases} x = 1 \cdot t + 3 \\ y = 5 \cdot t + 0 \\ z = -3 \cdot t + 1 \end{cases}$$

$\pi : 2y+5=0$

$$r \cap \pi : \begin{cases} x = t+3 \\ y = 5t \\ z = -3t+1 \\ 2y+5=0 \end{cases} \longrightarrow 10t+5=0 \Rightarrow t = -\frac{1}{2}$$

$$x = -\frac{1}{2}+3 = \frac{5}{2} \; ; \; y = -\frac{5}{2} \; ; \; z = -3\left(-\frac{1}{2}\right)+1 = \frac{5}{2}$$

$$C\left(\frac{5}{2}, -\frac{5}{2}, +\frac{5}{2}\right)$$

$$d(A,C) = \dots\dots = R$$

$$(x-x_c)^2+(y-y_c)^2+(z-z_c)^2 = R^2$$

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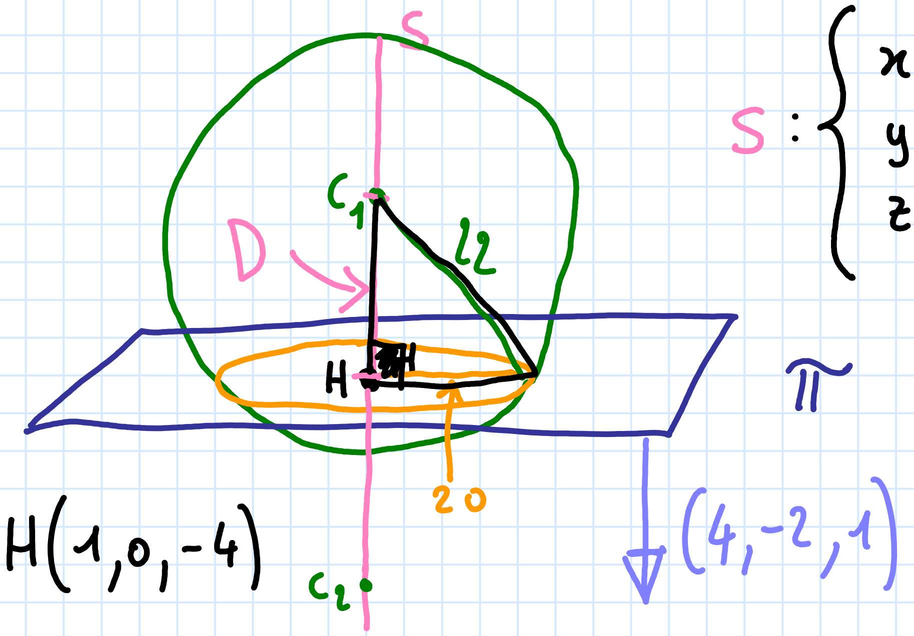
2 sfere $R=22$ che secano il piano $\pi : 4x-2y+z=0$ nella circonferente di centro $H(1,0,-4) \in \pi$ e raggio $r=20$



$$S:\begin{cases} x = 4\cdot t + 1 \\ y = -2\cdot t + 0 \\ z = 1\cdot t + (-4) \end{cases}$$

$$D = ? = \sqrt{22^2 - 20^2} = \sqrt{84}$$

$$C(4t+1,\ -2t,\ t-4)$$

$$d(C,H) = \sqrt{84}$$

$$d(C,H) = \sqrt{(4t)^2 + (-2t)^2 + (t)^2} = \sqrt{84}$$

$$16t^2 + 4t^2 + t^2 = 84$$

$$21t^2 = 84$$

$$t^2 = 4 \qquad t = \pm 2$$

$$C(4t+1,\ -2t,\ t-4)$$

$$t_1 = +2 \Rightarrow \boxed{C_1(9,\ -4,\ -2)}$$

$$t_2 = -2 \Rightarrow \boxed{C_2(-7,\ +4,\ -6)}$$