Ricevimento studenti - venerdì 12 gennaio 2024

Titolo nota 12/01/2024

Buongiorno e benvenuti al ricevimento studenti.
Io sto lavorando al computer. Fatevi <u>SENTIRE</u> (ho le cuffie) che poi accendo la telecamera e il microfono.

$r: 2x+7 = 2x+5z+7 = 0$

$s: 3y+20 = 3y+5z = 0$

t retta di minima distanza $\quad t \cap r = \{A\}$, $\ t \cap s = \{H\}$

$d(A,H) = d(r,s) = d$

B, C punti di s aventi distanza $2d$ da A

area $A\overset{\triangle}{B}C = ?$

$r: 2x+7 = 2x+5z+7 = 0$
$r \parallel$ asse Y

$$\begin{bmatrix} 2 & 0 & 0 \\ 2 & 0 & 5 \end{bmatrix} \quad \begin{array}{l} l = 0 \to 0 \\ m = -10 \to 1 \\ n = 0 \to 0 \end{array}$$

$s: 3y+20 = 3y+5z = 0$
$s \parallel$ asse X

$$\begin{bmatrix} 0 & 3 & 0 \\ 0 & 3 & 5 \end{bmatrix} \quad \begin{array}{l} l' = 15 \to 1 \\ m' = 0 \to 0 \\ n' = 0 \to 0 \end{array}$$

$r: 2x+7 = 5z = 0$

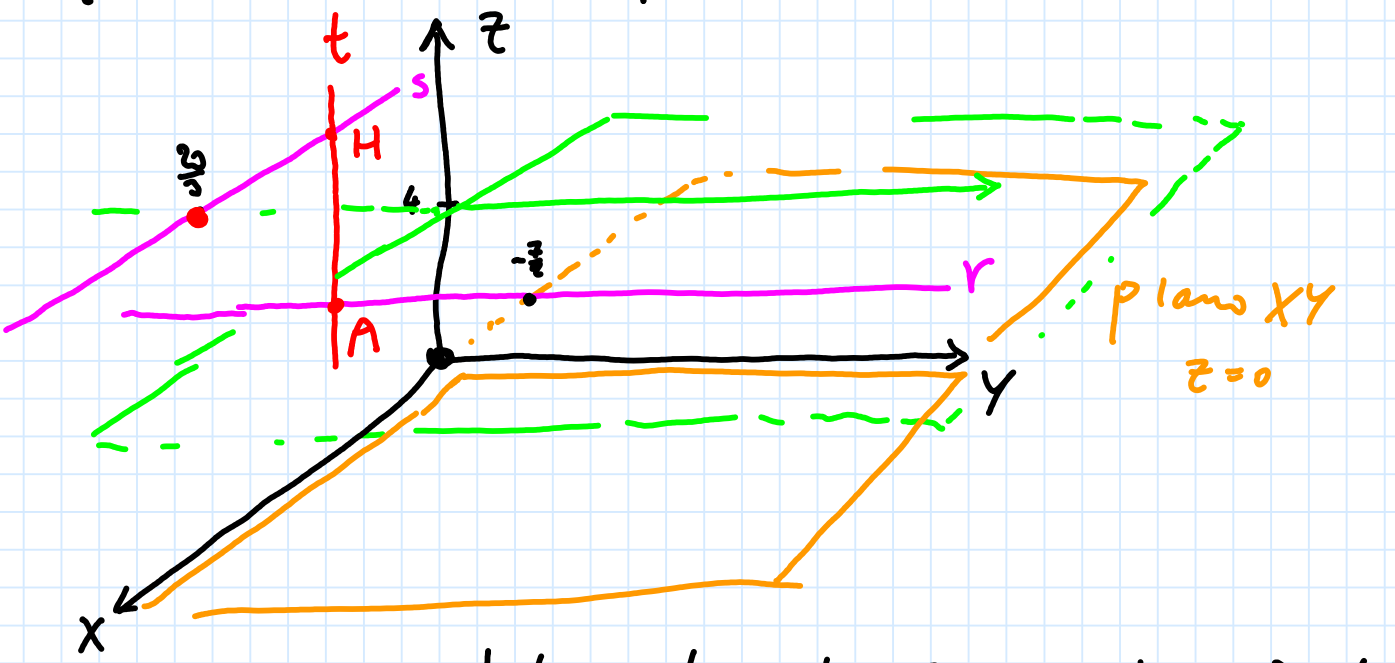
$r: 2x+7 = z = 0 \to$ r è sul piano XY

ed è la retta di equaz. $x = -\frac{7}{2} \parallel$ asse Y

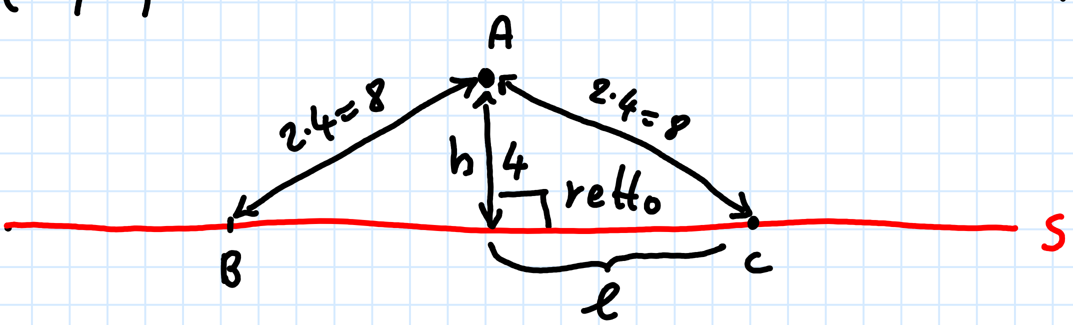
$s: 3y+20 = 3y+5z = 0$

$s:\ 3y+20 = 5z-20 = 0$

$$s: \begin{cases} y = -\frac{20}{3} \\ z = 4 \end{cases} \longrightarrow \text{è sul piano } z=4 \text{ ed è } /\!/ \text{ asse } X$$



$d(A,H) = 4 \longrightarrow$ distanza tra piano $z=0$ e piano $z=4$



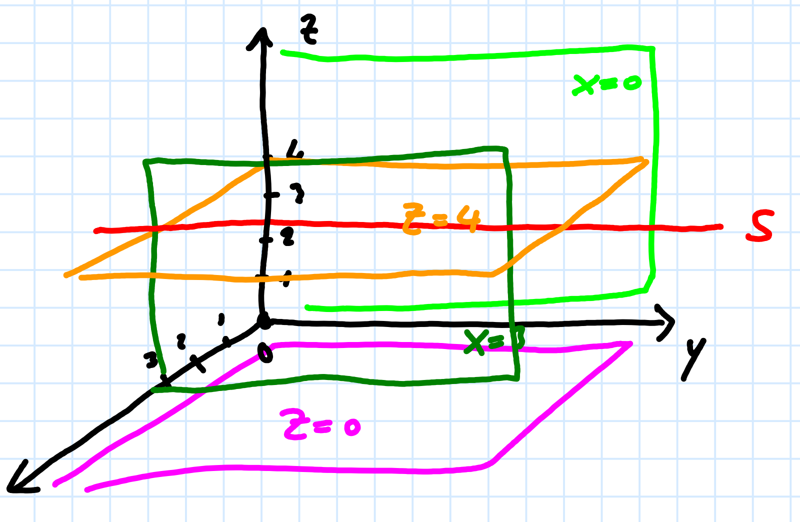
$$\ell = \sqrt{8^2-4^2} = \sqrt{64-16} = \sqrt{48} = 4\cdot\sqrt{3}$$

$$\text{area } \hat{ABC} = \frac{1}{2}\cdot(2\cdot\ell)\cdot h = \frac{1}{2}\cdot(2\cdot 4\cdot\sqrt{3})\cdot 4 = 16\sqrt{3}$$

$$r:\ \overset{\alpha}{\boxed{z-2}} = \overset{\beta}{\boxed{y-4z}} = 0$$

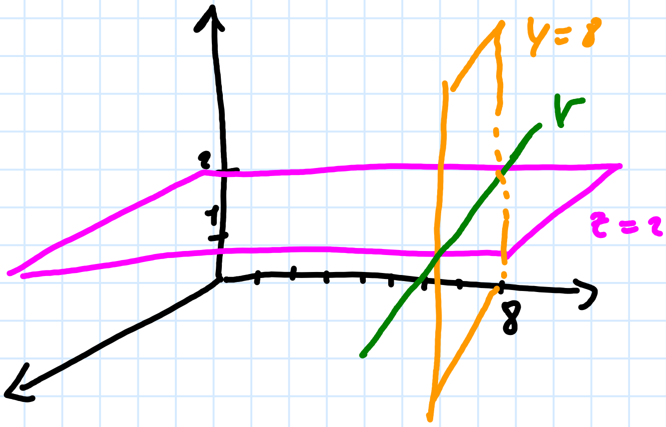
$$s:\ \underset{\alpha'}{\boxed{z-4}} = \underset{\beta'}{\boxed{4x-3z}} = 0$$

$$s: \begin{cases} z=4 \\ 4x-3z=0 \end{cases} \qquad \begin{cases} z=4 \\ x=3 \end{cases}$$



$$r:\begin{cases} z=2 \\ y-4z=0 \end{cases} \qquad \begin{cases} z=2 \\ y=8 \end{cases}$$

$$\boxed{t:\begin{cases} y=8 \\ x=3 \end{cases}}$$

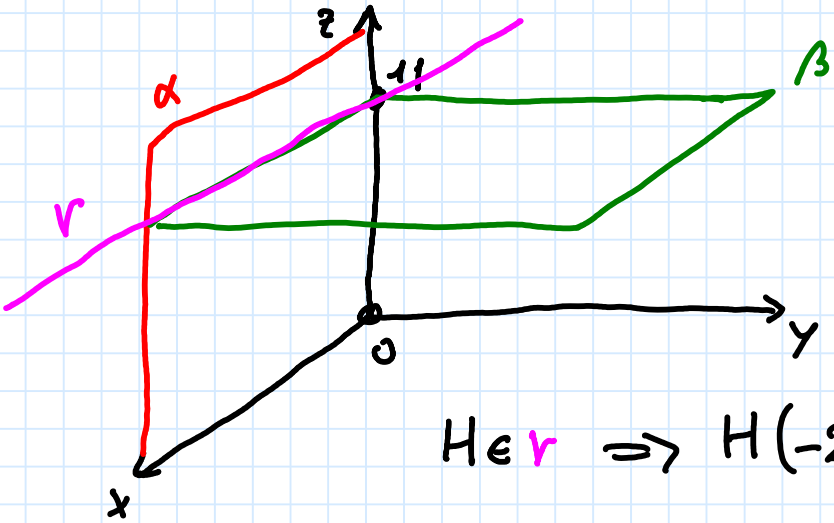


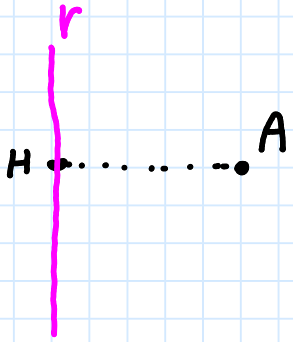
$A(-2,\ 3\sqrt{11},\ 8)$;

$r:\ y = z-11=0$

$$r:\begin{cases} y=0 & \alpha \quad \text{piano } XZ \\ z=11 & \beta \end{cases}$$

$B, C \in r$ tali che $\overset{\triangle}{ABC}$ equilatero

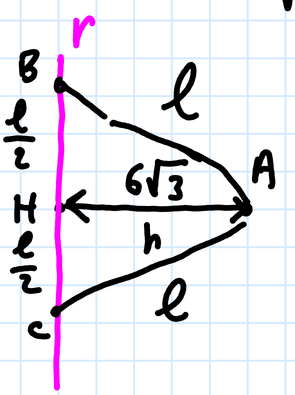




$H \in r \Rightarrow H(-2,0,11) \qquad A(-2,3\sqrt{11},8)$

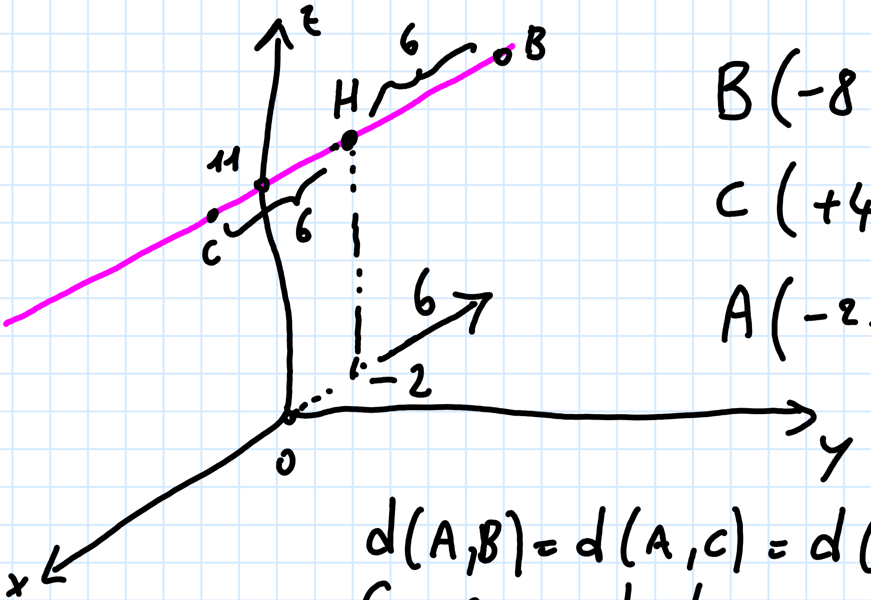
$$d(A,H)=\sqrt{(-2+2)^2+(0-3\sqrt{11})^2+(11-8)^2}=$$

$$=\sqrt{99+9}=\sqrt{108}=6\sqrt{3}$$



$$\ell = h\cdot\frac{2}{\sqrt{3}} = 6\cdot\sqrt{3}\cdot\frac{2}{\sqrt{3}} = 12$$

$$\frac{\ell}{2}=\frac{12}{2}=6$$



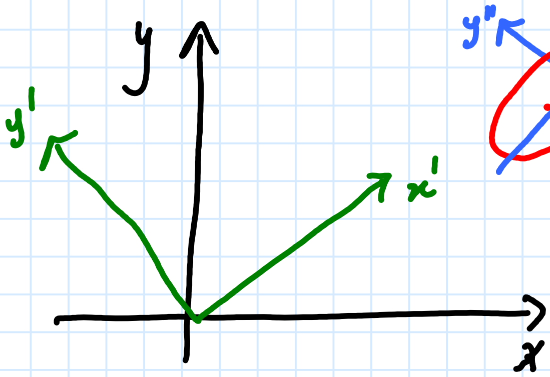
$B(-8, 0, 11)$

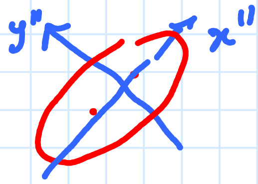
$C(+4, 0, 11)$

$A(-2, 3\sqrt{11}, 8)$

$d(A,B) = d(A,C) = d(B,C)$

↳ se volete verificare che è equilatero





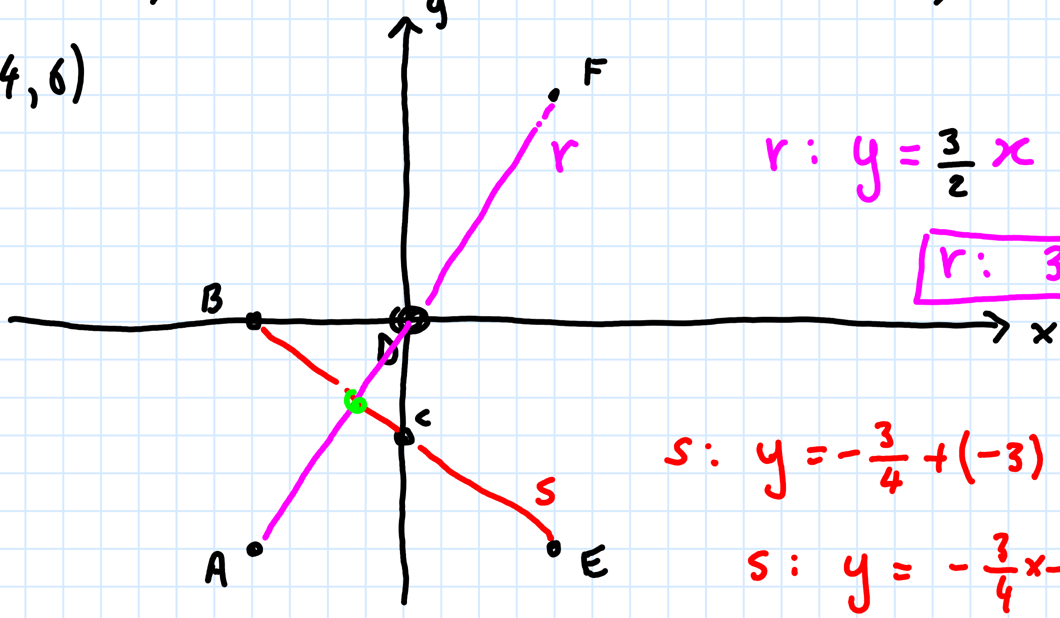
$$\frac{(x'')^2}{a^2} + \frac{(y'')^2}{b^2} = +1$$

canonica

$$5x^2 - 13xy + 9y^2 + 27x - 101y + 37 = 0$$

$A(-4,-6)$; $B(-4,0)$; $C(0,-3)$; $D(0,0)$; $E(4,-6)$;

$F(4,6)$



$r: y = \frac{3}{2}x$ OK!

$\boxed{r: 3x - 2y = 0}$

$s: y = -\frac{3}{4} + (-3)$

$s: y = -\frac{3}{4}x - 3$ OK!

$\boxed{s: 3x + 4y + 12 = 0}$

$\mathscr{C} = r \cup s : (3x - 2y) \cdot (3x + 4y + 12) = 0$

$3x^2 + 2\sqrt{3}xy + y^2 - 18x + 2\sqrt{3}y + 24 = 0$

$A = \begin{bmatrix} 3 & \sqrt{3} \\ \sqrt{3} & 1 \end{bmatrix}$; $p_A(\lambda) = \lambda^2 - 4\lambda + 0 = \lambda^2 - 4\lambda = \lambda(\lambda - 4)$

$\lambda_1 = 4$ $\lambda_2 = 0$

$A - 4 \cdot I_2 = \begin{bmatrix} -1 & \sqrt{3} \\ \sqrt{3} & -3 \end{bmatrix}$ $\begin{cases} -x + \sqrt{3}y = 0 \\ \sqrt{3}x - 3y = 0 \end{cases}$ L. DIP.

$x - \sqrt{3}y = 0 \longrightarrow x = \sqrt{3}y$

$(x,y) = (\sqrt{3}y, y) = y \cdot (\sqrt{3}, 1)$

$\forall y \neq 0$ ottengo un autovettore relativo a $\lambda_1 = 4$

$\vec{v} = (\sqrt{3}, 1)$ $\|\vec{v}\| = 2$

$\vec{u} = \frac{1}{2}\vec{v} = \frac{1}{2}(\sqrt{3}, 1) = \left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$ auto VERSORE

$$C = \begin{bmatrix} \frac{\sqrt{3}}{2} & -\frac{1}{2} \\ \frac{1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix} \rightarrow$$ associata ad una rotazione angolo $\theta = 30° = \frac{\pi}{6}$ rad.

$$\underset{\underset{4}{\parallel}}{\lambda_1}(x')^2 + \underset{\underset{0}{\parallel}}{\lambda_2}(y')^2 + \underset{?}{d'}x' + \underset{?}{e'}y' + 24 = 0$$

$$[-18 \quad 2\sqrt{3}] \cdot \begin{bmatrix} \frac{\sqrt{3}}{2} & -\frac{1}{2} \\ \frac{1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix} = [\, d' \quad e' \,]$$

$d' \downarrow -8\sqrt{3}$ $\quad e' \downarrow 12$

$$4(x')^2 - 8\sqrt{3}x' + 12y' + 24 = 0$$

$$\boxed{(x')^2 - 2\sqrt{3}x'} + 3y' + 6 = 0$$

$$\parallel$$

$$\boxed{(x' - \sqrt{3})^2 - 3} + 3y' + 6 = 0$$

traslazione $\quad x'' = x' - \sqrt{3}$

$$(x'')^2 + 3y' + 3 = 0 \qquad\qquad 3y' = (\sqrt{3})^2 \cdot y'$$

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

traslazione $\quad y'' = y' + 1$

$$y'' = -\frac{1}{3} \cdot (x'')^2$$ eq. canonica di una PARABOLA

$A(t,0,0)$; $B(0,-2,0)$; $C(0,0,\sqrt{23})$

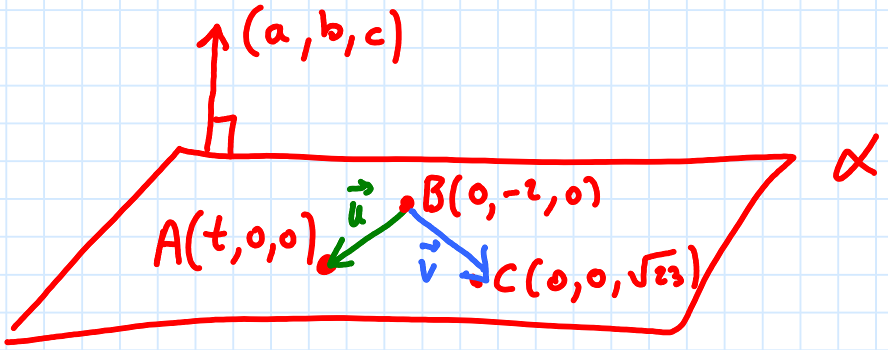
$t \in \mathbb{R}$: $A, B, C \in \alpha$

$\beta =$ piano YZ $\qquad \theta = \widehat{\alpha, \beta} = \frac{2}{3}\pi \text{ rad} = 120°$

(1) angolo tra 2 piani

$$\cos\theta = \pm \frac{a \cdot a' + b \cdot b' + c \cdot c'}{\sqrt{a^2+b^2+c^2} \cdot \sqrt{(a')^2+(b')^2+(c')^2}}$$

$\beta =$ piano YZ : $x = 0 \qquad \underbrace{1}_{a'} \cdot x + \underbrace{0}_{b'} y + \underbrace{0}_{c'} z + 0 = 0$



$\vec{u} = (t, 2, 0)$; $\vec{v} = (0, 2, \sqrt{23})$

$$\vec{u} \wedge \vec{v} = \det \begin{bmatrix} \vec{i} & \vec{j} & \vec{k} \\ t & 2 & 0 \\ 0 & 2 & \sqrt{23} \end{bmatrix} = \underbrace{(2\sqrt{23})}_{a}\vec{i} + \underbrace{(-t\sqrt{23})}_{b}\vec{j} + \underbrace{(2t)}_{c}\vec{k}$$

$a' = 1 \qquad b' = 0 \qquad c' = 0$

$\theta = \frac{2}{3}\pi \text{ rad} = 120° \Rightarrow \cos\theta = -\frac{1}{2}$

$$-\frac{1}{2} = \pm \frac{2\sqrt{23}}{1 \cdot \sqrt{92 + 23t^2 + 4t^2}}$$

$$-\sqrt{92+27t^2} = \pm 4\sqrt{23}$$

$$92+27t^2 = 16\cdot 23 = 368$$

$$27t^2 = 368-92 =$$

$$27t^2 = 276$$

$$9t^2 = 92 \longrightarrow t^2 = \frac{92}{9} \rightarrow t = \pm\frac{\sqrt{92}}{3}$$

$$\boxed{t = \pm\frac{2\sqrt{23}}{3}}$$