$\boxed{4}$ $r \begin{cases} x - y = 1 \\ 2x + z = 0 \end{cases}$ $s \begin{cases} y + z = 2 \\ y - 3z = 1 \end{cases}$

(1) Eq parametriche

giac(r) $\begin{cases} x - y = 0 \\ 2x + z = 0 \end{cases} \Longrightarrow$ giac(r) $= \text{Span}\begin{pmatrix} 1 \\ 1 \\ -2 \end{pmatrix}$

$$\Longrightarrow \quad r = \begin{pmatrix} 1 \\ 0 \\ -2 \end{pmatrix} + \text{Span}\begin{pmatrix} 1 \\ 1 \\ -2 \end{pmatrix}$$

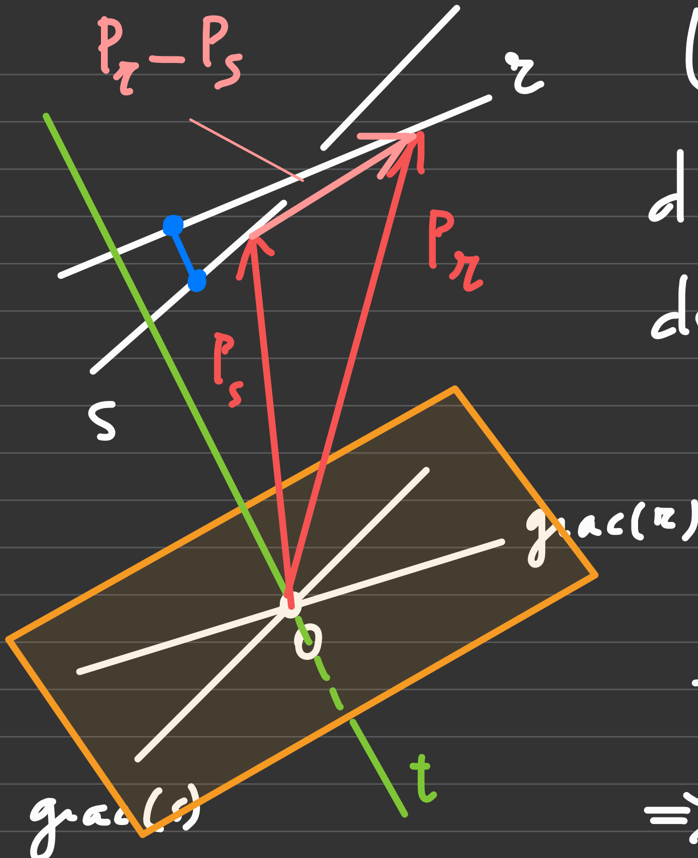
↳ sol part del sist non omog

$$r = \begin{pmatrix} 1 \\ 0 \\ -2 \end{pmatrix} + \operatorname{Span}\begin{pmatrix} 1 \\ 1 \\ -2 \end{pmatrix} \qquad s = \begin{pmatrix} 0 \\ 7/4 \\ 1/4 \end{pmatrix} + \operatorname{Span}\begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$$

$\text{giac}(r) \neq \text{giac}(s) \Rightarrow$ r e s non coincidono né sono parallele

$$r \cap s \quad \begin{cases} x - y = 1 \\ 2x + z = 0 \\ y + z = 2 \\ y - 3z = 1 \end{cases} \quad \begin{cases} x = \frac{11}{4} \\ 2\,\frac{11}{4} + \frac{1}{4} = 0 \\ y = \frac{7}{4} \\ z = \frac{1}{4} \end{cases} \quad \text{impossibile}$$

$\Rightarrow r \cap s = \emptyset \Rightarrow$ r e s sghembe



$$\left(\text{grac}(r) + \text{grac}(s)\right)^{\perp} = t$$

$$d(r,s) = \| pr_t (P_r - P_s) \|$$

dove $P_r \in r$ e $P_s \in s$

$$\text{grac}(r) + \text{grac}(s) = \text{Span}\begin{pmatrix}1\\0\\0\end{pmatrix}\begin{pmatrix}1\\1\\-2\end{pmatrix}$$

eq cartesiane $\quad 2y + z = 0$

$$\Rightarrow t = \text{Span}\begin{pmatrix}0\\2\\1\end{pmatrix}$$

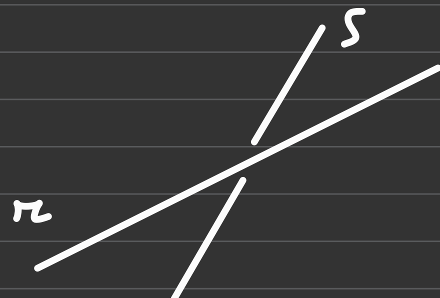
$$P_r = \begin{pmatrix} 1 \\ 0 \\ -2 \end{pmatrix} \qquad P_s = \begin{pmatrix} 0 \\ 7/4 \\ 1/4 \end{pmatrix}$$

$$\Rightarrow \quad P_r - P_s = \begin{pmatrix} 1 \\ -7/4 \\ -9/4 \end{pmatrix}$$

$$\Rightarrow \quad pr_{\begin{pmatrix} 0 \\ 2 \\ 1 \end{pmatrix}} \begin{pmatrix} 1 \\ -7/4 \\ -9/4 \end{pmatrix} = \frac{-\frac{7}{2} - \frac{9}{4}}{5} \begin{pmatrix} 0 \\ 2 \\ 1 \end{pmatrix} = -\frac{23}{20} \begin{pmatrix} 0 \\ 2 \\ 1 \end{pmatrix}$$

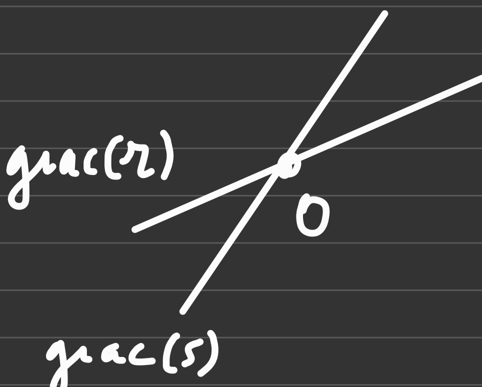
$$\Rightarrow \quad d(r, s) = \left\| -\frac{23}{20} \begin{pmatrix} 0 \\ 2 \\ 1 \end{pmatrix} \right\| = \frac{23}{20} \sqrt{5}$$

(11) $f\ \mathbb{R}^3 \to \mathbb{R}^3$ affine t.c. $f(s) = r$



$f = \tau_r \circ g \circ \tau_s$

τ_s = trasl che porta s in giac(s)



g = appl lineare che manda giac(s) in giac(r)

τ_r = trasl che manda giac(r) in r

$$\tau_s\begin{pmatrix}x\\y\\z\end{pmatrix} = \begin{pmatrix}x\\y\\z\end{pmatrix} - \begin{pmatrix}0\\7/4\\1/4\end{pmatrix} \qquad \tau_r\begin{pmatrix}x\\y\\z\end{pmatrix} = \begin{pmatrix}x\\y\\z\end{pmatrix} + \begin{pmatrix}1\\0\\-2\end{pmatrix}$$

$$g \quad \mathbb{R}^3 \to \mathbb{R}^3 \qquad \mathcal{B} = \left(\begin{pmatrix}1\\0\\0\end{pmatrix}, \begin{pmatrix}0\\1\\0\end{pmatrix}, \begin{pmatrix}0\\0\\1\end{pmatrix}\right)$$

$g\begin{pmatrix}1\\0\\0\end{pmatrix} = \begin{pmatrix}1\\1\\-2\end{pmatrix}$, così $g(\mathrm{giac}(s)) = \mathrm{giac}(r)$

$g\begin{pmatrix}0\\1\\0\end{pmatrix} = g\begin{pmatrix}0\\0\\1\end{pmatrix} = \begin{pmatrix}0\\0\\0\end{pmatrix}$ definiscono un'unica g

$$\Rightarrow \quad [g]^{C}_{C} = \begin{pmatrix}1 & 0 & 0\\1 & 0 & 0\\-2 & 0 & 0\end{pmatrix}$$

$$\begin{pmatrix} x \\ y \\ z \end{pmatrix} \xmapsto{\tau_s} \begin{pmatrix} x \\ y - 7/4 \\ z - 1/4 \end{pmatrix} \xmapsto{g} \begin{pmatrix} 1 & 0 & 0 \\ 1 & 0 & 0 \\ -2 & 0 & 0 \end{pmatrix} \begin{pmatrix} x \\ y - 7/4 \\ z - 1/4 \end{pmatrix} =$$

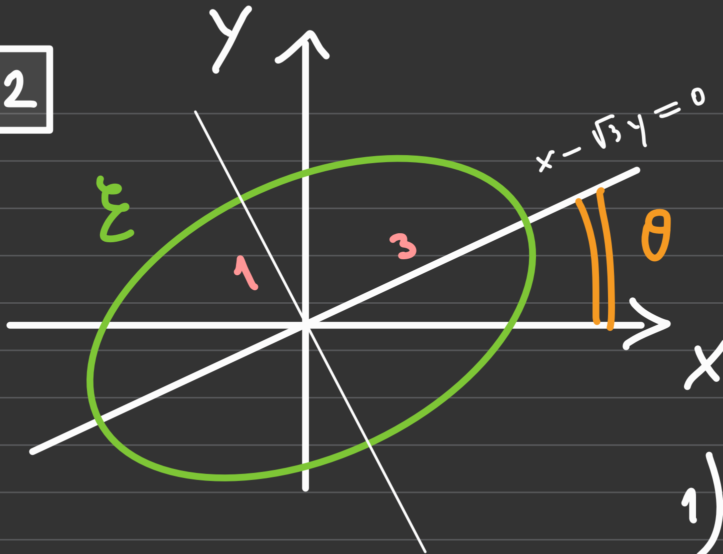
$$= \begin{pmatrix} x \\ x \\ -2x \end{pmatrix} \xmapsto{\tau_r} \begin{pmatrix} x+1 \\ x \\ -2x-2 \end{pmatrix}$$

$$\Rightarrow \quad f\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} x+1 \\ x \\ -2x-2 \end{pmatrix}$$

<u>Verifica</u> $\quad P_s = \begin{pmatrix} \mu \\ 7/4 \\ 1/4 \end{pmatrix} \xmapsto{f} \begin{pmatrix} \mu+1 \\ \mu \\ -2\mu-2 \end{pmatrix} \in r \, ?$

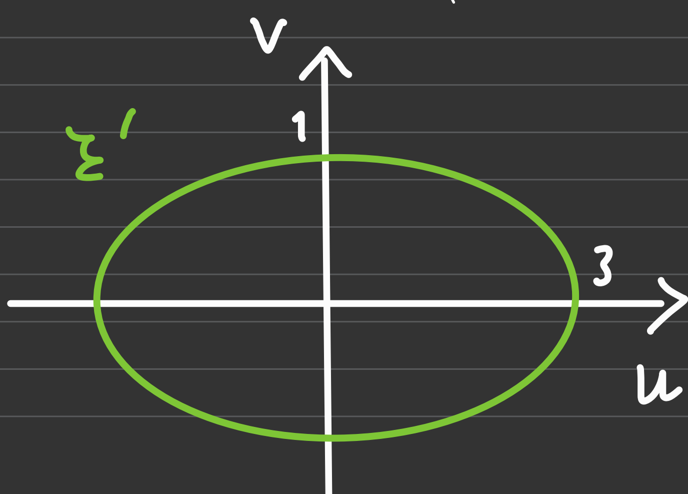
Sì perché verifica le eq di r

$\boxed{12}$



$\mathcal{E}$ ellisse di semiassi 3 e 1

asse maggiore
$x - \sqrt{3}y = 0$



1) La forma canonica di $\mathcal{E}$ è

$$\mathcal{E}' \qquad \frac{u^2}{9} + v^2 = 1$$

2) L'isometria f che manda $\mathcal{E}$ in $\mathcal{E}'$ è $rot_{-\theta}$

- Calcoliamo θ

$$\operatorname{tg}\theta = \frac{1}{\sqrt{3}}$$

$$\Rightarrow \theta = \pi/6$$

$\begin{pmatrix} \sqrt{3} \\ 1 \end{pmatrix} \in r \qquad \begin{pmatrix} 1 \\ 0 \end{pmatrix} \in \text{asse } x$

$$\cos\theta = \frac{\left\langle \begin{pmatrix} \sqrt{3} \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \end{pmatrix} \right\rangle}{\left\| \begin{pmatrix} \sqrt{3} \\ 1 \end{pmatrix} \right\| \left\| \begin{pmatrix} 1 \\ 0 \end{pmatrix} \right\|} = \frac{\sqrt{3}}{2}$$

$$\Rightarrow \theta = \pi/6$$

- $$[f]_C^C = [rot\_\theta]_C^C = \begin{pmatrix} \sqrt{3}/2 & 1/2 \\ -1/2 & \sqrt{3}/2 \end{pmatrix} = R$$

$$\Longrightarrow \quad f\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} \sqrt{3}/2 & 1/2 \\ -1/2 & \sqrt{3}/2 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} \sqrt{3}/2\, x + 1/2\, y \\ -1/2\, x + \sqrt{3}/2\, y \end{pmatrix}$$

- $$\xi = f^{-1}(\xi') =$$

$$= \left\{ f^{-1}\begin{pmatrix} u \\ v \end{pmatrix} \quad \begin{pmatrix} u \\ v \end{pmatrix}^T \begin{pmatrix} 1/9 & 0 \\ 0 & 1 \end{pmatrix}\begin{pmatrix} u \\ v \end{pmatrix} = 1 \right\} =$$

$$= \left\{ \begin{pmatrix} x \\ y \end{pmatrix} \quad \underbrace{\left(R\begin{pmatrix} x \\ y \end{pmatrix}\right)^T \begin{pmatrix} 1/9 & 0 \\ 0 & 1 \end{pmatrix}\left(R\begin{pmatrix} x \\ y \end{pmatrix}\right)}_{= \begin{pmatrix} x \\ y \end{pmatrix}^T R^T \begin{pmatrix} 1/9 & 0 \\ 0 & 1 \end{pmatrix} R \begin{pmatrix} x \\ y \end{pmatrix}} = 1 \right\}$$

$$\mathcal{E} \quad \begin{pmatrix} x \\ y \end{pmatrix}^T \underbrace{R^T \begin{pmatrix} 1/9 & 0 \\ 0 & 1 \end{pmatrix} R} \begin{pmatrix} x \\ y \end{pmatrix} = 1$$

$$\begin{pmatrix} \sqrt{3}/2 & -\frac{1}{2} \\ \frac{1}{2} & \frac{\sqrt{3}}{2} \end{pmatrix} \begin{pmatrix} \frac{1}{9} & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} \sqrt{3}/2 & \frac{1}{2} \\ -\frac{1}{2} & \frac{\sqrt{3}}{2} \end{pmatrix} =$$

$$= \begin{pmatrix} \sqrt{3}/18 & -\frac{1}{2} \\ \frac{1}{18} & \frac{\sqrt{3}}{2} \end{pmatrix} \begin{pmatrix} \sqrt{3}/2 & \frac{1}{2} \\ -\frac{1}{2} & \frac{\sqrt{3}}{2} \end{pmatrix} = \begin{pmatrix} \frac{1}{3} & -\frac{2}{9}\sqrt{3} \\ -\frac{2}{9}\sqrt{3} & 7/9 \end{pmatrix}$$

$$\Rightarrow \mathcal{E} \quad \frac{1}{3}x^2 + \frac{7}{9}y^2 - \frac{4}{9}\sqrt{3}\,xy = 1$$

$$\mathcal{E} \quad 3x^2 + 7y^2 - 4\sqrt{3}\,xy - 9 = 0$$

$\boxed{8}$

$$r_1 = \begin{pmatrix} 1 \\ 0 \\ 1 \\ 0 \end{pmatrix} + \left\langle \begin{pmatrix} 1 \\ 1 \\ -1 \\ 1 \end{pmatrix} \right\rangle \qquad r_2 = \left\langle \begin{pmatrix} 2 \\ 1 \\ 0 \\ \lambda \end{pmatrix} \right\rangle$$

(i) $\dim(r_1 + r_2)$ al variare di λ

- $\underline{0} \in r_2$ ma $\underline{0} \notin r_1 \Longrightarrow r_1 \neq r_2$
- $\forall \lambda$ $\text{giac}(r_1) \neq \text{giac}(r_2) \Longrightarrow r_1$ e r_2 non parallele

Studiamo $r_1 \cap r_2$

$$r_1 = \left\{ \begin{pmatrix} 1+t \\ t \\ 1-t \\ t \end{pmatrix} \quad t \in \mathbb{R} \right\} \qquad r_2 = \left\{ \begin{pmatrix} 2s \\ s \\ 0 \\ \lambda s \end{pmatrix} \quad s \in \mathbb{R} \right\}$$

$$r_1 \cap r_2 \neq \emptyset \iff \exists\, t, s \in \mathbb{R} \text{ t.c. } \begin{pmatrix} 1+t \\ t \\ 1-t \\ t \end{pmatrix} = \begin{pmatrix} 2s \\ s \\ 0 \\ \lambda s \end{pmatrix}$$

$$\iff \begin{cases} 1+t = 2s \\ t = s \\ 1-t = 0 \\ t = \lambda s \end{cases} \iff \begin{cases} 1+1 = 2 \\ s = 1 \\ t = 1 \\ 1 = \lambda \end{cases}$$

$$\lambda = 1 \implies r_1 \cap r_2 \neq \emptyset \text{ e } r_1 \cap r_2 = \left\{ \begin{pmatrix} 2 \\ 1 \\ 0 \\ 1 \end{pmatrix} \right\}$$

e quindi sono incidenti

$$\lambda \neq 1 \implies r_1 \cap r_2 = \emptyset \implies \text{sghembe}$$

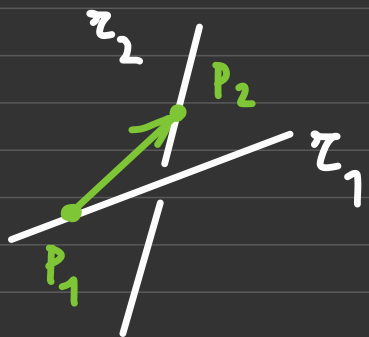
$$\lambda = 1 \implies \dim(r_1 + r_2) = 1 + 1 - 0 = 2$$

$$\lambda \neq 1 \implies r_1 \cap r_2 = \emptyset \implies$$

$$\implies \dim(r_1 + r_2) = \dim(\text{giac}(r_1) + \text{giac}(r_2)) + 1 =$$

$$= 1 + 1 - \underset{\substack{\uparrow \\ \dim(\text{giac}(r_1) \cap \text{giac}(r_2))}}{0} + 1 = 3$$

(ii) $\lambda = 0$, $d(r_1, r_2)$



$$P_1 = \begin{pmatrix} 1+t \\ t \\ 1-t \\ t \end{pmatrix} \qquad P_2 = \begin{pmatrix} 2s \\ s \\ 0 \\ 0 \end{pmatrix}$$

$$P_2 - P_1 = \begin{pmatrix} 2s-1-t \\ s-t \\ t-1 \\ -t \end{pmatrix}$$

$P_2 - P_1$ realizza la min dist $\iff$ $P_2 - P_1 \perp$ giac(r_1) e giac(r_2)

$$P_2 - P_1 \perp \text{giac}(r_1) \iff \left\langle P_2 - P_1, \begin{pmatrix} 1 \\ 1 \\ -1 \\ 1 \end{pmatrix} \right\rangle = 0$$

$$\iff 2s - \cancel{1} - t + s - t - t \cancel{+1} - t = 0$$

$$P_2 - P_1 \perp \text{giac}(r_2) \iff 4s - 2 - 2t + s - t = 0$$

$$\begin{cases} 3s - 4t = 0 \\ 5s - 3t = 2 \end{cases} \iff s = \frac{8}{11} \text{ e } t = \frac{6}{11}$$

$$\Rightarrow P_1 = \left(\frac{17}{11}, \frac{6}{11}, \frac{5}{11}, \frac{6}{11}\right) \text{ e } P_2 = \left(\frac{16}{11}, \frac{8}{11}, 0, 0\right)$$

$$\Rightarrow d(r,s) = \| P_2 - P_1 \| = \sqrt{\frac{6}{11}}$$

SIMUL CONICHE

$$\mathcal{C} \quad \underbrace{3x^2+2xy+3y^2}_{\begin{pmatrix} x \\ y \end{pmatrix}^T \begin{pmatrix} 3 & 1 \\ 1 & 3 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}} + 2hx = 0 \quad , \qquad h \in \mathbb{R}$$

$$\iff \begin{pmatrix} x \\ y \\ 1 \end{pmatrix}^T \left(\begin{array}{cc|c} 3 & 1 & h \\ 1 & 3 & 0 \\ \hline h & 0 & 0 \end{array}\right) \begin{pmatrix} x \\ y \\ 1 \end{pmatrix} = 0$$

$\mathcal{C}$ degenere $\iff \det \left(\begin{array}{cc|c} 3 & 1 & h \\ 1 & 3 & 0 \\ \hline h & 0 & 0 \end{array}\right) = 0 \iff h = 0$

(ii) $h = \sqrt{2} \Rightarrow \quad \mathcal{C} \quad 3x^2 + 2xy + 3y^2 + 2\sqrt{2}x = 0$

$$A = \begin{pmatrix} 3 & 1 \\ 1 & 3 \end{pmatrix} \qquad p_A(\lambda) = \lambda^2 - 6\lambda + 8$$

$$\Rightarrow \underbrace{\lambda = 4 \text{ e } \lambda = 2}_{\text{autovalori}}$$

$\Rightarrow A$ è simile a $D = \begin{pmatrix} 2 & 0 \\ 0 & 4 \end{pmatrix} \Rightarrow \mathcal{C}$ è ellisse

(iii) Autovettori di A

$$V_2 = \operatorname{Ker} \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix} = \operatorname{Span} \begin{pmatrix} 1 \\ -1 \end{pmatrix}$$

$$V_4 = \operatorname{Ker} \begin{pmatrix} -1 & 1 \\ 1 & -1 \end{pmatrix} = \operatorname{Span} \begin{pmatrix} 1 \\ 1 \end{pmatrix}$$

$$\mathcal{B} = \left(\begin{pmatrix} 1/\sqrt{2} \\ -1/\sqrt{2} \end{pmatrix}, \begin{pmatrix} 1/\sqrt{2} \\ 1/\sqrt{2} \end{pmatrix} \right)$$ base ortonormale di autovettori

$$\Rightarrow [id]^{\mathcal{B}}_{\mathcal{C}} = \begin{pmatrix} 1/\sqrt{2} & 1/\sqrt{2} \\ -1/\sqrt{2} & 1/\sqrt{2} \end{pmatrix}$$ è ortogonale

$$\Rightarrow [id]^{\mathcal{C}}_{\mathcal{B}} = \left([id]^{\mathcal{B}}_{\mathcal{C}}\right)^T = \begin{pmatrix} 1/\sqrt{2} & -1/\sqrt{2} \\ 1/\sqrt{2} & 1/\sqrt{2} \end{pmatrix}$$

$$R = \begin{pmatrix} 1/\sqrt{2} & -1/\sqrt{2} \\ 1/\sqrt{2} & 1/\sqrt{2} \end{pmatrix}$$ rot di angolo $\frac{\pi}{4}$

$$\Rightarrow A = R^T D R$$

$$\begin{pmatrix}x\\y\end{pmatrix}^T A \begin{pmatrix}x\\y\end{pmatrix} = \begin{pmatrix}x\\y\end{pmatrix}^T R^T D R \begin{pmatrix}x\\y\end{pmatrix} =$$

$$= \left(R\begin{pmatrix}x\\y\end{pmatrix}\right)^T D \left(R\begin{pmatrix}x\\y\end{pmatrix}\right) \longrightarrow = \begin{pmatrix}u\\v\end{pmatrix}$$

$$g \quad R^2 \to \mathbb{R}^2 \qquad g\begin{pmatrix}x\\y\end{pmatrix} = R\begin{pmatrix}x\\y\end{pmatrix} = \begin{pmatrix}\frac{1}{\sqrt{2}}x - \frac{1}{\sqrt{2}}y\\ \frac{1}{\sqrt{2}}x + \frac{1}{\sqrt{2}}y\end{pmatrix}$$

$$\Rightarrow \begin{cases} u = \frac{1}{\sqrt{2}}x - \frac{1}{\sqrt{2}}y \\ v = \frac{1}{\sqrt{2}}x + \frac{1}{\sqrt{2}}y \end{cases}, \quad \begin{cases} x = \frac{1}{\sqrt{2}}u + \frac{1}{\sqrt{2}}v \\ y = -\frac{1}{\sqrt{2}}u + \frac{1}{\sqrt{2}}v \end{cases}$$

Trasformiamo $\mathcal{C}$ con g, $\mathcal{C}' = g(\mathcal{C})$

$\mathcal{C}'$
$$2u^2 + 4v^2 + 2\sqrt{2}\left(\frac{1}{\sqrt{2}}u + \frac{1}{\sqrt{2}}v\right) = 0$$

$$u^2 + 2v^2 + u + v = 0$$

Cerchiamo una traslazione che elimini i termini di primo grado

$\mathcal{C}'$
$$\left(u+\frac{1}{2}\right)^2 + 2\left(v+\frac{1}{4}\right)^2 - \frac{1}{4} - \frac{1}{8} = 0$$

$$\Rightarrow \tau\begin{pmatrix} u \\ v \end{pmatrix} = \begin{pmatrix} u + 1/2 \\ v + 1/4 \end{pmatrix}, \quad \tau \ \mathbb{R}^2 \to \mathbb{R}^2$$

Alternativamente

$$\begin{pmatrix} z \\ w \end{pmatrix} = \tau \begin{pmatrix} u \\ v \end{pmatrix} = \begin{pmatrix} u+a \\ v+b \end{pmatrix}$$ e scriviamo $\mathcal{C}'' = \tau(\mathcal{C}')$

$$\tau \quad \begin{cases} z = u+a \\ w = v+b \end{cases} \qquad \begin{cases} u = z-a \\ v = w-b \end{cases}$$

$$\mathcal{C}'' \qquad (z-a)^2 + 2(w-b)^2 + z - a + w - b = 0$$

$$z^2 - 2az + a^2 + 2w^2 - 4bw + 4b^2 + z - a + w - b = 0$$

$$1 - 2a = 0 \implies a = 1/2$$

$$1 - 4b = 0 \implies b = 1/4$$

$\mathcal{C}''$ $\quad z^2 + 2w^2 - 3/8 = 0$

$$\frac{8}{3} z^2 + \frac{16}{3} w^2 = 1$$

$\Rightarrow$ $\mathcal{C}''$ è un'ellisse di semiassi $\sqrt{\frac{3}{8}}$ e $\frac{\sqrt{3}}{4}$

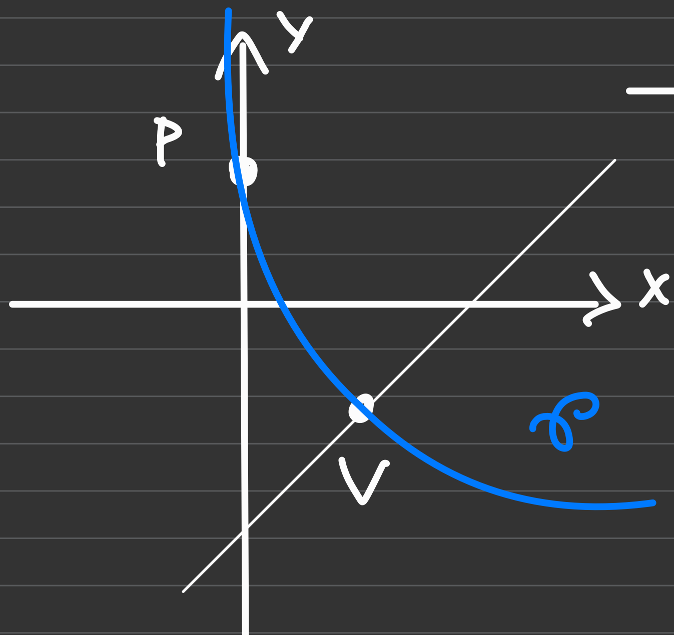
La trasf f $\mathbb{R}^2 \to \mathbb{R}^2$ che porta $\mathcal{C}$ nella sua forma canonica $\mathcal{C}''$ è

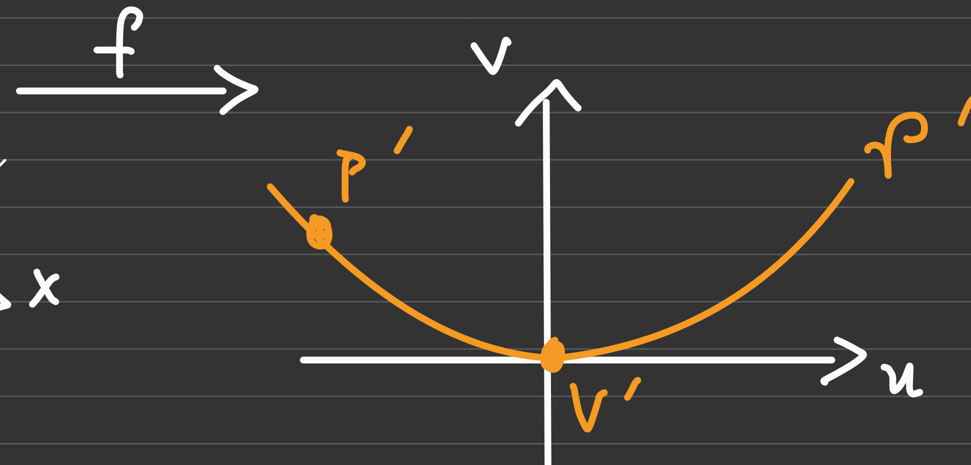
$f = \tau \circ g$, ossia

$$f\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} \frac{1}{\sqrt{2}}x - \frac{1}{\sqrt{2}}y + \frac{1}{2} \\ \frac{1}{\sqrt{2}}x + \frac{1}{\sqrt{2}}y + \frac{1}{4} \end{pmatrix}$$

$\boxed{11}$ $\mathcal{P}$ $V=(2,-2)$, passa per $P=(0,2)$

asse parall a $y=x \Rightarrow \underbrace{y=x-4}_{\text{asse}}$





$\mathcal{P}'$ forma canonica di $\mathcal{P}$

$$v = au^2$$

$$\Rightarrow f = \mathrm{rot}_{\frac{\pi}{4}} \circ \tau_{\binom{-2}{2}}$$

$$f\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1/\sqrt{2} & -1/\sqrt{2} \\ 1/\sqrt{2} & 1/\sqrt{2} \end{pmatrix} \begin{pmatrix} x-2 \\ y+2 \end{pmatrix}$$

$$P' = f(P) = f\begin{pmatrix} 0 \\ 2 \end{pmatrix} = \begin{pmatrix} 1/\sqrt{2} & -1/\sqrt{2} \\ 1/\sqrt{2} & 1/\sqrt{2} \end{pmatrix} \begin{pmatrix} -2 \\ 4 \end{pmatrix} = \begin{pmatrix} -6/\sqrt{2} \\ 2/\sqrt{2} \end{pmatrix}$$

r' passa per P' $\Longrightarrow$ $\dfrac{2}{\sqrt{2}} = a\left(-\dfrac{6}{\sqrt{2}}\right)^2 = 18a$

$$\Longrightarrow \quad a = \frac{1}{9\sqrt{2}} \quad \Longrightarrow \quad r' \quad v = \frac{1}{9\sqrt{2}} u^2$$

Troviamo $\gamma = f^{-1}(\gamma')$

$$\begin{pmatrix} u \\ v \end{pmatrix} = f\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} \frac{1}{\sqrt{2}}x - \frac{1}{\sqrt{2}}y - 2\sqrt{2} \\ \frac{1}{\sqrt{2}}x + \frac{1}{\sqrt{2}}y \end{pmatrix}$$

$$\Rightarrow \gamma \qquad \frac{1}{\sqrt{2}}x + \frac{1}{\sqrt{2}}y = \frac{1}{9\sqrt{2}}\left(\frac{1}{\sqrt{2}}x - \frac{1}{\sqrt{2}}y - 2\sqrt{2}\right)^2$$