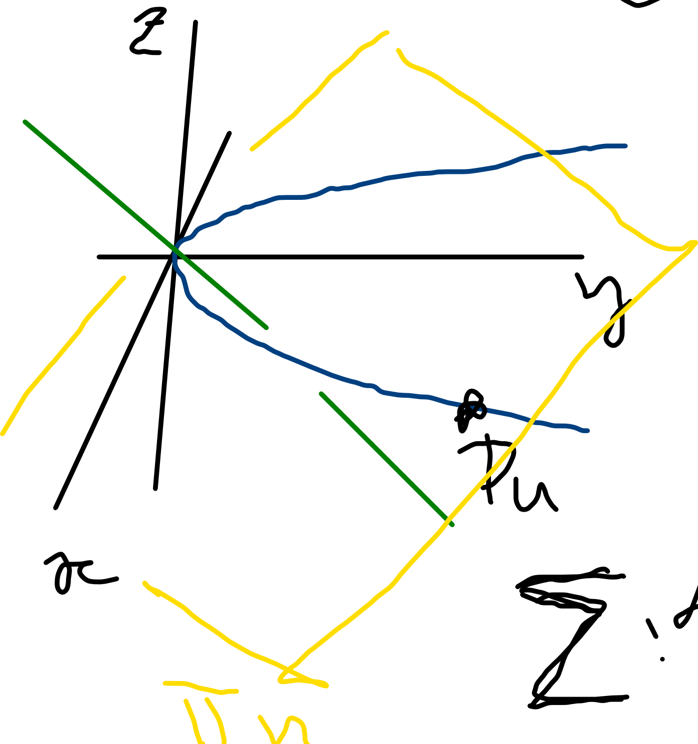
Es 10 a

$$C: \begin{cases} z = 0 \\ y = x^2 \end{cases} \qquad r: \begin{cases} x = z \\ y = 0 \end{cases} \; (l,m,n) \; (1,0,1)$$

Piano Π_u per P_u e $\perp r$.



$$\begin{cases} x = u \\ y = u^2 \\ z = 0 \end{cases} \qquad P_u \equiv (u, u^2, 0) \qquad 1(x-u) + 0(y-u^2) + 1(z-0) = 0$$

$$\Pi_u: x + z - u = 0$$

$$S_u: (x-0)^2 + (y-0)^2 + (z-0)^2 = (u-0)^2 + (u^2-0)^2 + (0-0)^2$$

$$x^2 + y^2 + z^2 = u^2 + u^4$$

$$\Sigma: \begin{cases} x + z - u = 0 \\ x^2 + y^2 + z^2 - u^2 - u^4 = 0 \end{cases}$$

$$\Sigma: x^2 + y^2 + z^2 - (x+z)^2 - (x+z)^4 = 0$$

Supf. di rot. di $\mathcal{C}$: $\begin{cases} z=0 \\ y=x^2 \end{cases}$ attorno all'asse z :

$P_u \equiv (u, u^2, 0)$ $\quad \mathcal{S}_u : x^2+y^2+z^2-u^2-u^4=0$

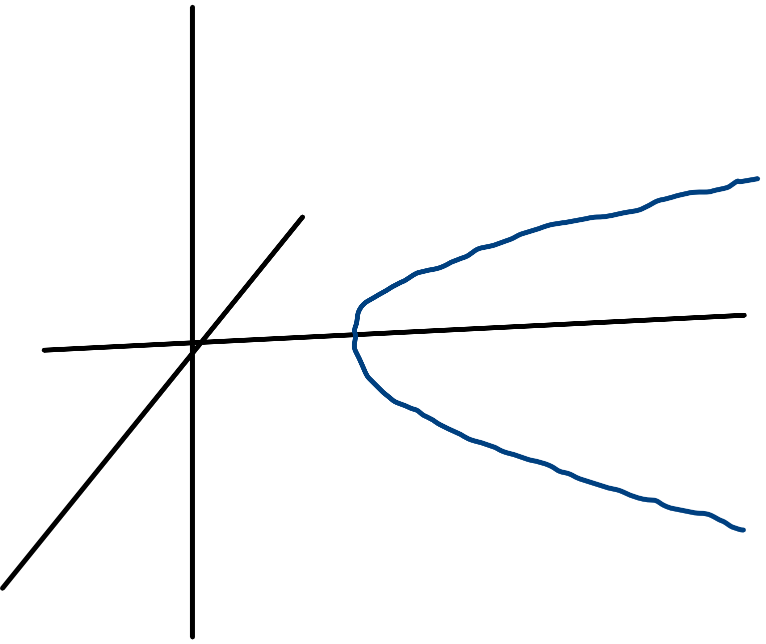
asse z : $\begin{cases} x=0 \\ y=0 \end{cases}$

$(l, m, n) \sim (0,0,1)$

piano per P_u, $\perp$ asse z : $0(x-u)+0(y-u^2)+(z-0)=0$

$$\Sigma : \begin{cases} z=0 \\ x^2+y^2+z^2-u^2-u^4=0 \end{cases}$$

$$\Sigma : z=0$$



$$\ell : \begin{cases} z = 0 \\ y = x^2 + 1 \end{cases} \qquad \begin{cases} x = u \\ y = u^2 + 1 \\ z = 0 \end{cases} \qquad P_u = (u, u^2+1, 0)$$

$$\mathcal{S}_u : x^2 + y^2 + z^2 = (u-0)^2 + (u^2+1)^2 + (0-0)^2$$

$$x^2 + y^2 + z^2 = u^2 + u^4 + 2u^2 + 1$$

$$\begin{cases} x^2 + y^2 + z^2 = u^4 + 3u^2 + 1 \\ z = 0 \end{cases}$$

$$z = 0$$

$$u = \frac{i}{2}$$

$$u^2 = -\frac{1}{4}$$

$$u^4 = \frac{1}{16}$$

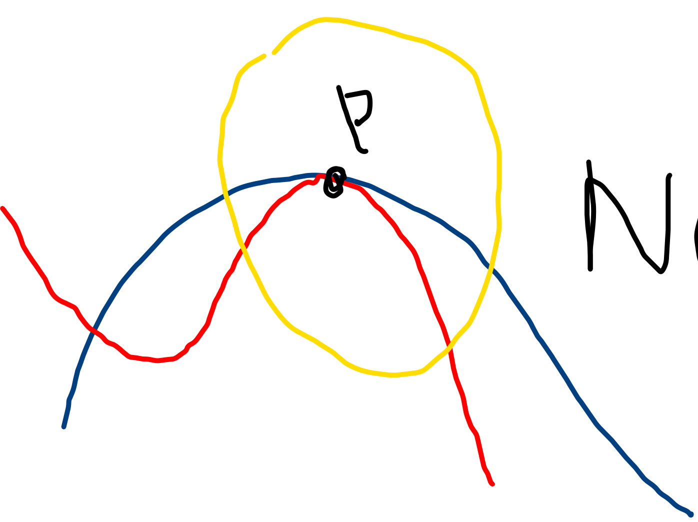
$$u^4 + 3u^2 + 1 = \frac{1}{16} - \frac{3}{4} + 1 =$$

$$= \frac{1 - 12 + 16}{16} = \frac{5}{16}$$

Curve C_1 e C_2 con punto comune P.

Diciamo che si attraversano in P se accade quanto segue:

$\exists$ un intorno di P nel piano che viene separato da C_1 in due parti e C_2 è separata da P in un arco contenuto in una parte e un arco contenuto nell'altra



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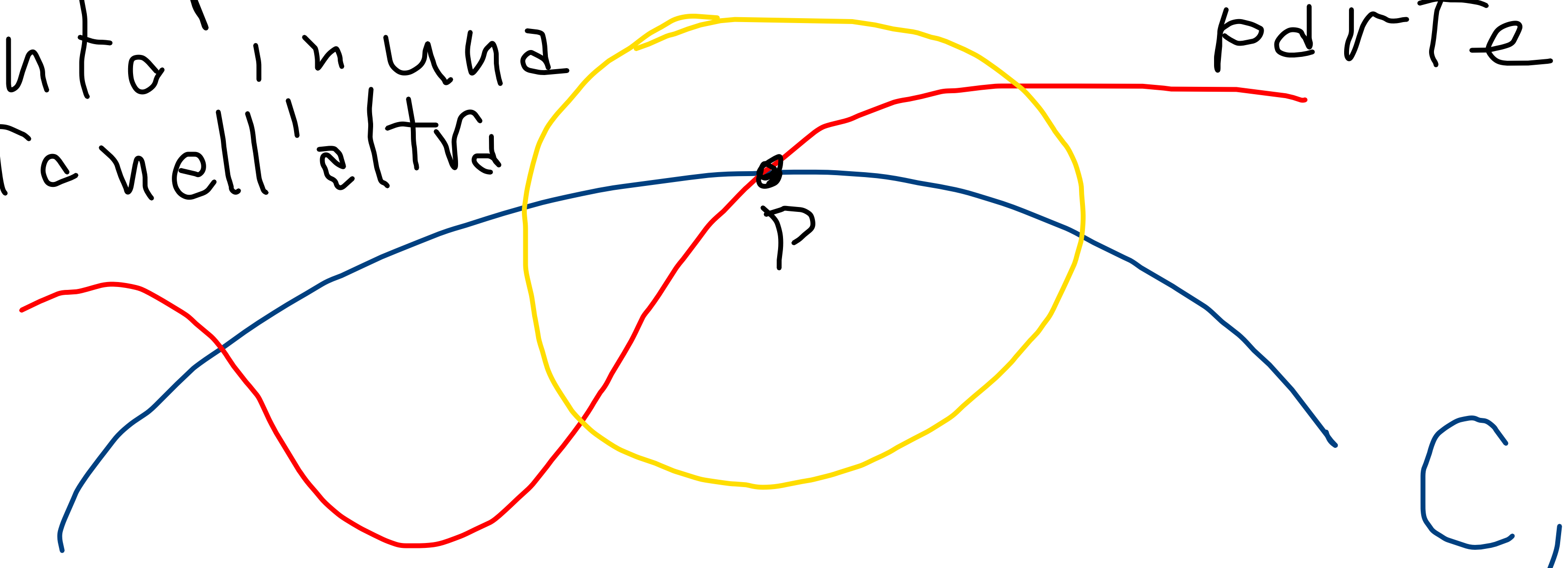


SÌ

$C_1 : y = f(x) \qquad f(0) = 0$

$C_2 : y = \varphi(x) \qquad \varphi(0) = 0$

$$y = x f'(0) + \frac{x^2}{2} f''(0) + \cdots + \frac{x^n}{n!} f^{(n)}(0) + \frac{x^{n+1}}{(n+1)!} f^{(n+1)}(0) + \cdots$$

$$-\,y = -\,x \varphi'(0) + -\,\frac{x^2}{2} \varphi''(0) + \cdots - + \frac{x^n}{n!} \varphi^{(n)}(0) + -\,\frac{x^{n+1}}{(n+1)!} \varphi^{(n+1)}(0) + \cdots$$

$$= 0 + 0 - \cdots + 0 + \frac{x^{n+1}}{(n+1)!} \cdot \neq 0 + \cdots$$

Es 22 $\Sigma : x^3 - 2y^2 - 2z - 4x + 4 = 0$ $\quad P = (2,0,2)$

mediante contatto: piano π tang. a Σ in P. $(u,v) = (2,0)$

Generico piano per P: $a(x-2) + b(y-0) + c(z-2) = 0$

$$F(x,y,z) = ax + by + cz - 2a - 2c = 0$$

$$\Sigma : \begin{cases} x = u \\ y = v \\ z = \frac{1}{2}(u^3 - 2v^2 - 4u + 4) = \frac{u^3}{2} - v^2 - 2u + 2 \end{cases}$$

Φ fz. composta

$$\Phi(u,v) = F\left(u, v, \tfrac{1}{2}(\ )\right) = au + bv + c\frac{u^3}{2} - cv^2 - 2cu + \cancel{2c} - 2a - \cancel{2c} =$$

$$= (a-2c)u + bv + c\frac{u^3}{2} - cv^2 - 2a$$

$$\Phi'_u = (a-2c) + \frac{3}{2}cu^2 \qquad a - 2c + 6c = a + 4c$$

$$\Phi'_v = b - 2cv \qquad b$$

$(2,0)$

$\Phi_u(2,0) = 0$

$\Phi_v(2,0) = 0$

$$\begin{cases} a + 4c = 0 \\ b = 0 \end{cases} \qquad a = -4c$$

scelgo $c = 1$

$a = -4$

$$\boxed{-4x + z + 6 = 0}$$

$\Sigma : x^3 - 2y^2 - 2z - 4x + 4 = 0 \qquad P \equiv (2, 0, 2)$

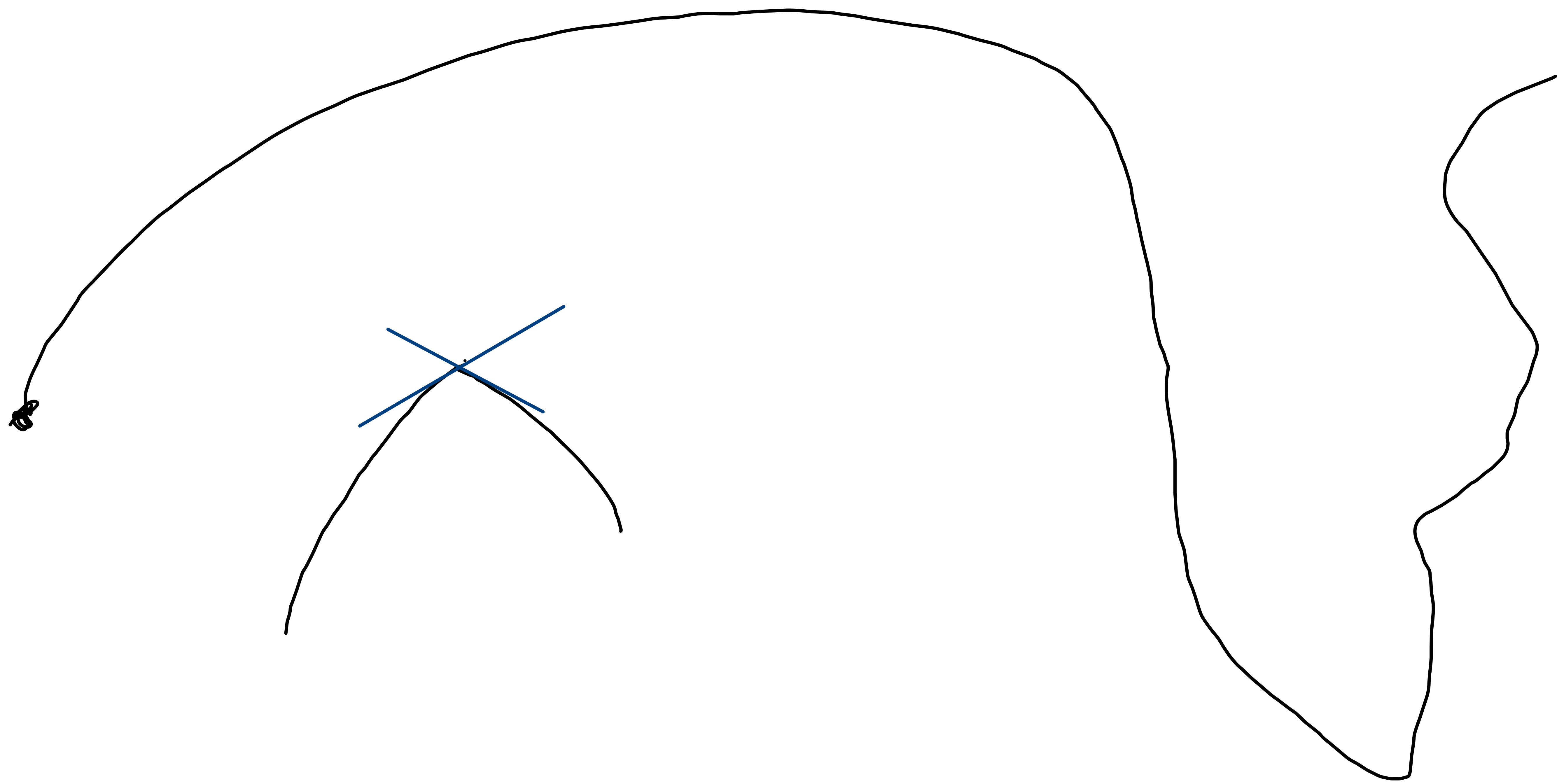
$f(x, y, z)$

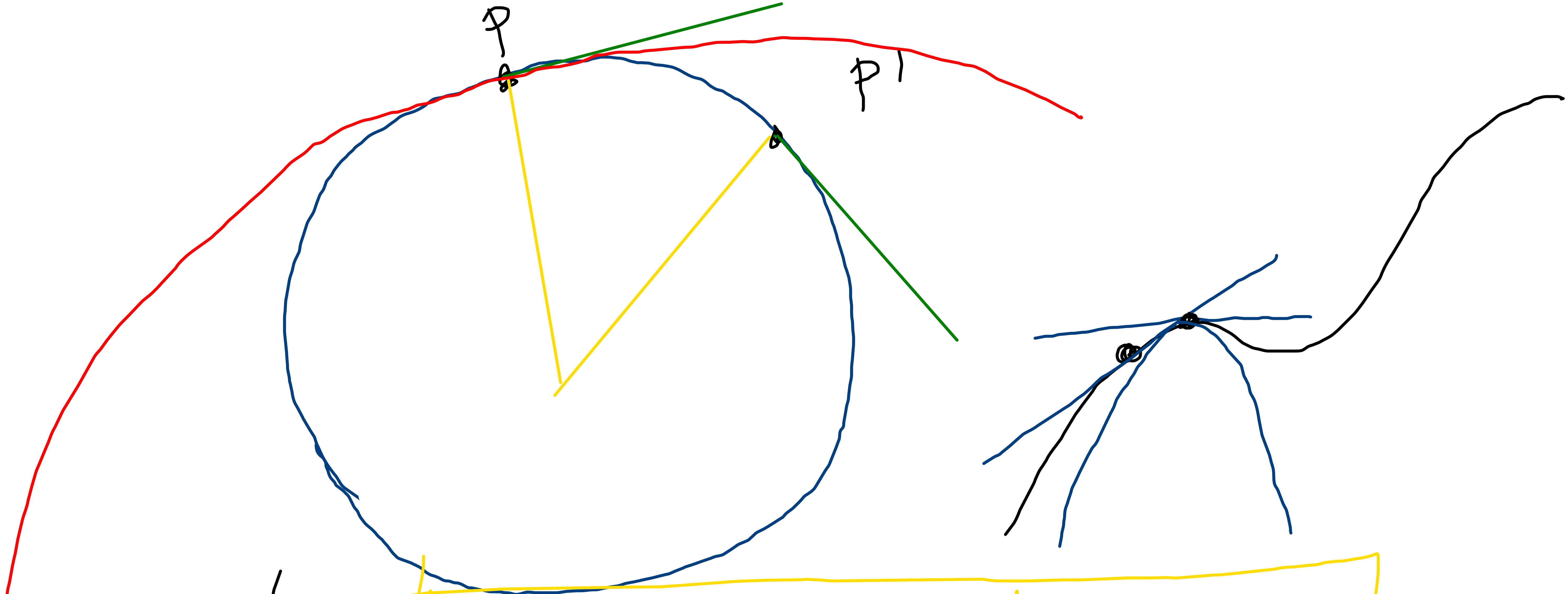
	$(2,0,2)$
$f_x = 3x^2 - 4$	8
$f_y = -4y$	0
$f_z = -2$	-2

$$8(x-2) + 0(y-0) - 2(z-2) = 0$$

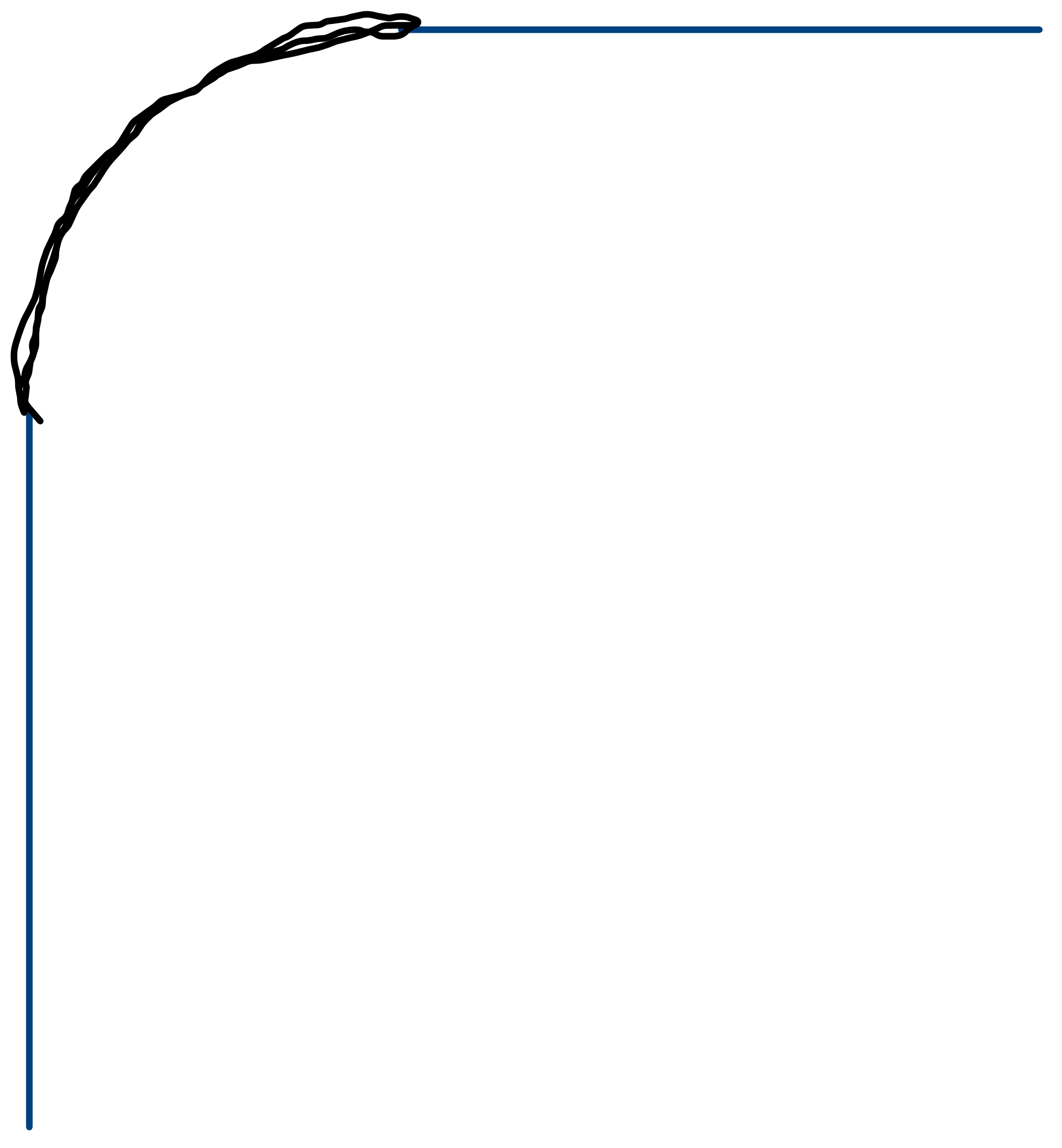
$$8x - 2z - 12 = 0$$

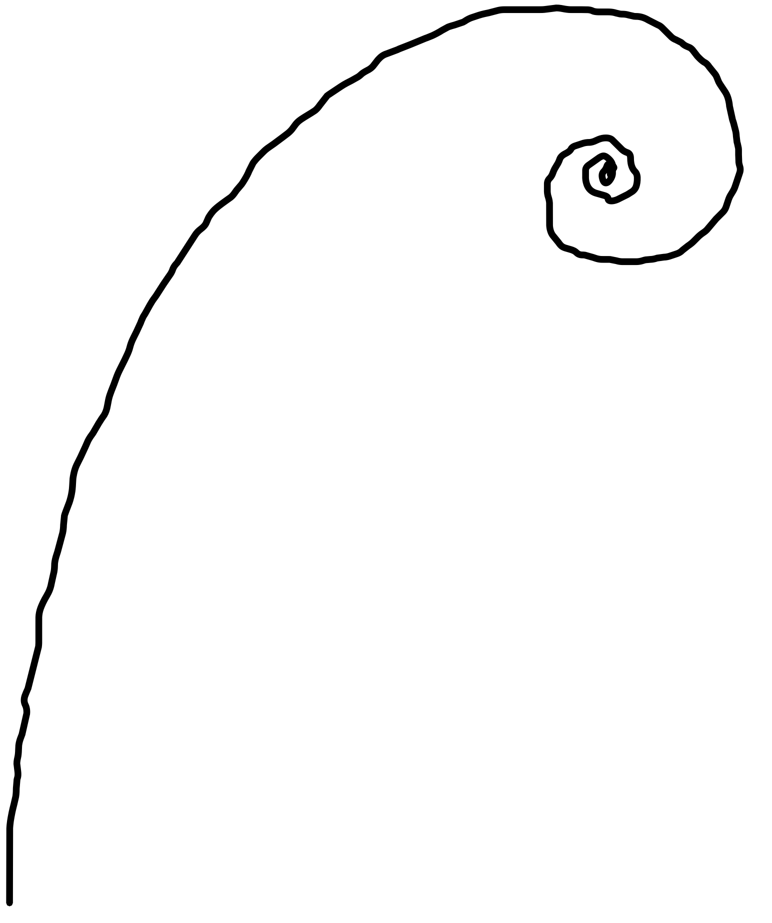
$$-4x + z + 6 = 0$$





$$y = f(x) = \boxed{\boxed{f(x_0) + x \cdot f'(x_0)} + \frac{x^2}{2} f''(x_0)} + \cdots$$





Es 9 $\quad C: \; y = 1/x$

Trovare le circ. osc. in $P \equiv (2, 1/2)$, $Q \equiv (1,1)$ e gli ordini di contatto

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$$\rho: \begin{cases} x = u \\ y = 1/u \end{cases}$$

$F(x,y) = x^2 + y^2 + ax + by + c = 0$

$$\Phi(u) = u^2 + \frac{1}{u^2} + au + \frac{b}{u} + c$$

$$\Phi'(u) = 2u - \frac{b}{u^2} - \frac{2}{u^3} + a$$

$$\Phi''(u) = \frac{2b}{u^3} + \frac{6}{u^4} + 2$$

$$\Phi'''(u) = -\frac{6b}{u^4} - \frac{24}{u^5}$$

$$\Phi^{iv}(u) = \frac{24b}{u^5} + \frac{120}{u^6}$$

$u = 2$

$$\begin{cases} c + \frac{b}{2} + 2a + 17 = 0 \\ -\frac{b}{4} + a + \frac{15}{4} = 0 \\ \frac{b}{4} + \frac{19}{8} = 0 \end{cases}$$

$(a, b, c) = \left(-\frac{45}{8}, -\frac{19}{8}, \frac{51}{4}\right)$

$-\frac{3b}{8} - \frac{3}{4} = \frac{9}{64} \neq 0$

ordine = 2

$u = 1$