Info

This note, that was found here, as a part of a collection
is written (completely with human hands) by Rupadarshi Ray,
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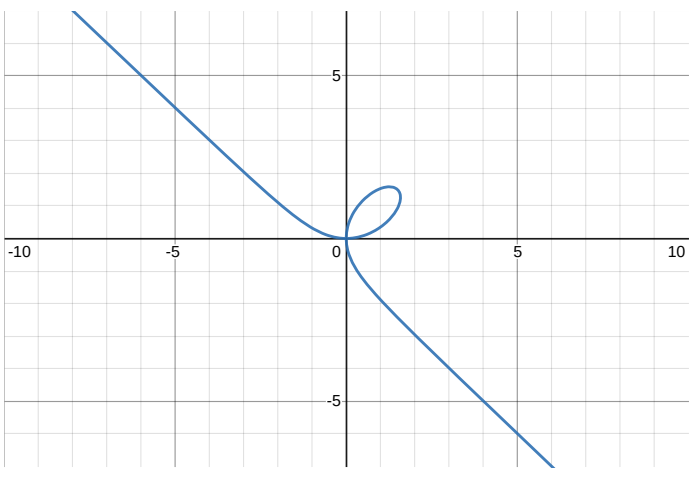
Folium of Descartes

$$X^3 + Y^3 - 3aXY$$

in $\mathbb{R}$

The level sets look like:



The asymptote lies on the line

$$y + x + a = 0$$

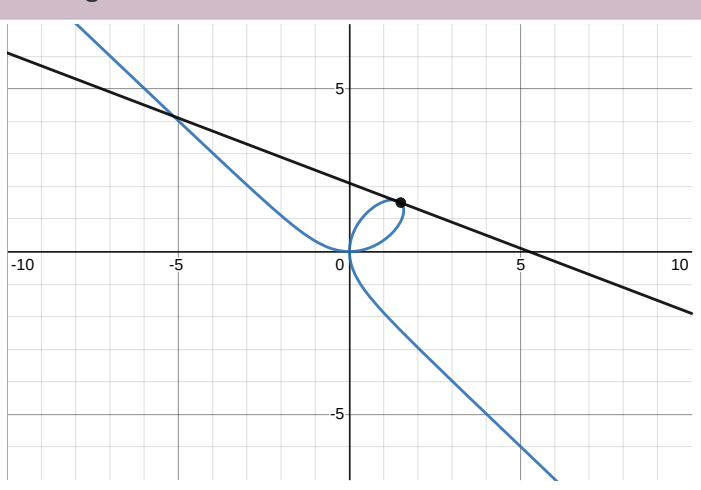
derivative

For some $a \in \mathbb{R}$

$$\mathrm{d}(X^3 + Y^3 - 3aXY) = (3X^2 - 3aY)\mathrm{d}X + (3Y^2 - 3aX)\mathrm{d}Y$$

tangent

Bug



parameter "a" removal

We have the "parameter removal"

$$\begin{aligned}
& X^3 + Y^3 - 3aXY && = 0 \\
\implies\ & X^3 + Y^3 && = 3aXY \\
\implies\ & (X^3 + Y^3)/(3XY) && = a \qquad \text{on } \mathbb{R}^{\times 2} \\
\implies\ & \mathrm{d}\left(\tfrac{X^3+Y^3}{3XY}\right) && = 0
\end{aligned}$$

parameterization of zero set

[1]

polar

$$\begin{aligned}
[0, 2\pi] &\to \mathbb{R}_{\geq 0} \to \mathbb{R}^2 \\
\theta &\mapsto r(\theta) := \frac{3a \sin\theta \cos\theta}{\sin^3\theta + \cos^3\theta}
\end{aligned}$$

rational

$$\begin{aligned}
\mathbb{R} \setminus \{-1\} &\to \mathbb{R}^2 \\
t &\mapsto \left(\frac{3at}{1+t^3}, \frac{3at^2}{1+t^3}\right)
\end{aligned}$$

in $\mathbb{R}P^2$

Current note has 0 direct children and 0 total descendants.

- squishy
  - Polynomials
    - Folium of Descartes

      $$X^3 + Y^3 - 3aXY$$

And it has 17 siblings.

- squishy
  - Polynomials
    - $X^n + Y^n = Z^n$
    - $8X^3 + 4X^2 - 4X - 1$
    - $x^2 + y^2 - 3$

- Folium of Descartes

$$X^3 + Y^3 - 3aXY$$

- $X^3 + Y^3 - a$
- $3X^3 + 10X^2 + 3 - Y^2$
- $3X^8 + 10X^4 + 3 - Y^2$
- $XYZ - 1$
- Pythagorean triples
- Bolza curve
- Irreducible polynomials in $\mathbb{C}[x, y]$
- Polynomial maps $\mathbb{C}^n \to \mathbb{C}^n$ of degree at most d
- Chebyshev polynomials of the first kind
- Logistic map
- Dynamics of the map $z^2 + c$
- $\begin{pmatrix} x \\ y \\ y \end{pmatrix} \mapsto \begin{pmatrix} (1+xy)^3 z + y^2(1+xy)(4+3xy) \\ y + 3x(1+xy)^2 z + 3xy^2(4+3xy) \\ 2x - 3x^2 y - x^3 z \end{pmatrix}$
- $(w^2 - 1)^2$

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1. vixra.org/pdf/1707.0242v1.pdf ↩