Three Dimensional Plots

1. Surfaces
   - the graph of a function
   - equations in three variables
   - surfaces in parameter form
2. Space Curves
   - defined in parameter form
   - as the intersection of two surfaces
3. Four Dimensional Plots
   - a Riemann surface

MCS 320 Lecture 27
Introduction to Symbolic Computation
Jan Verschelde, 12 July 2024

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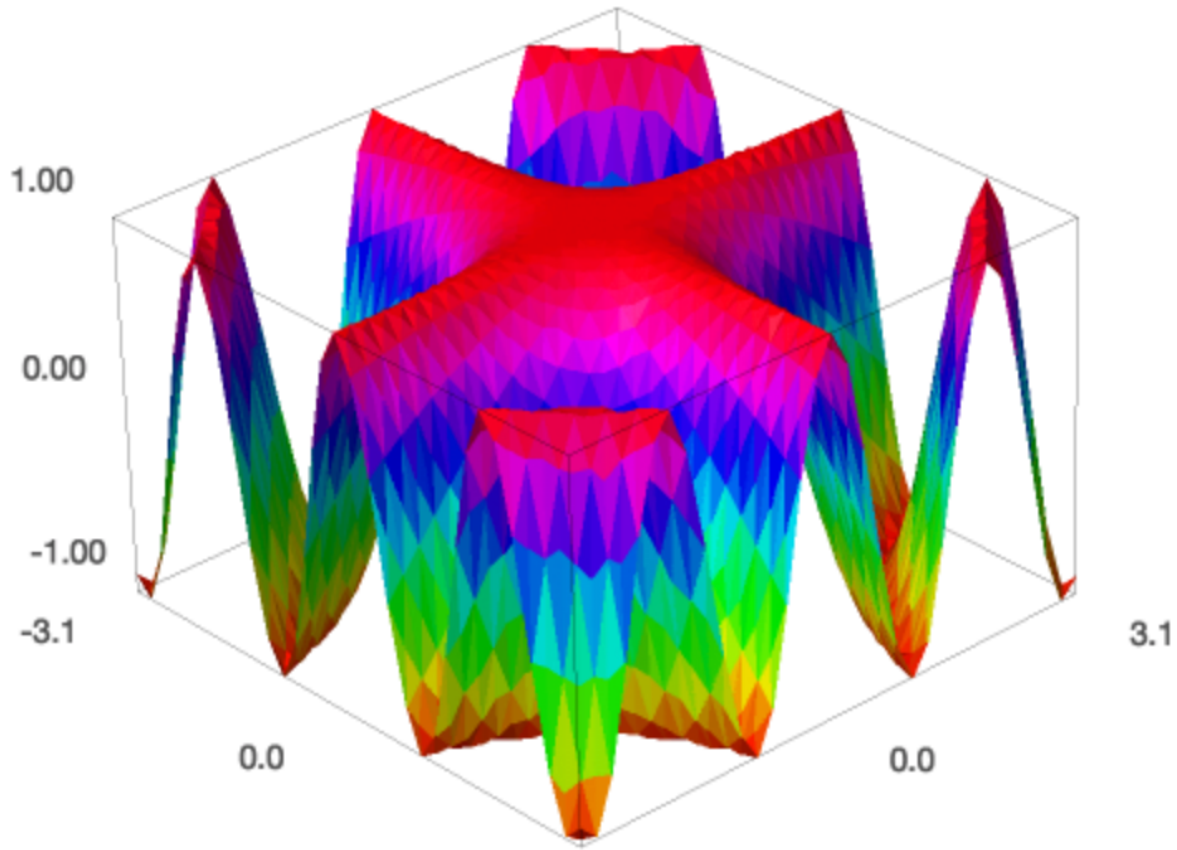
the Graph of a Function $z = \cos(x \cdot y)$



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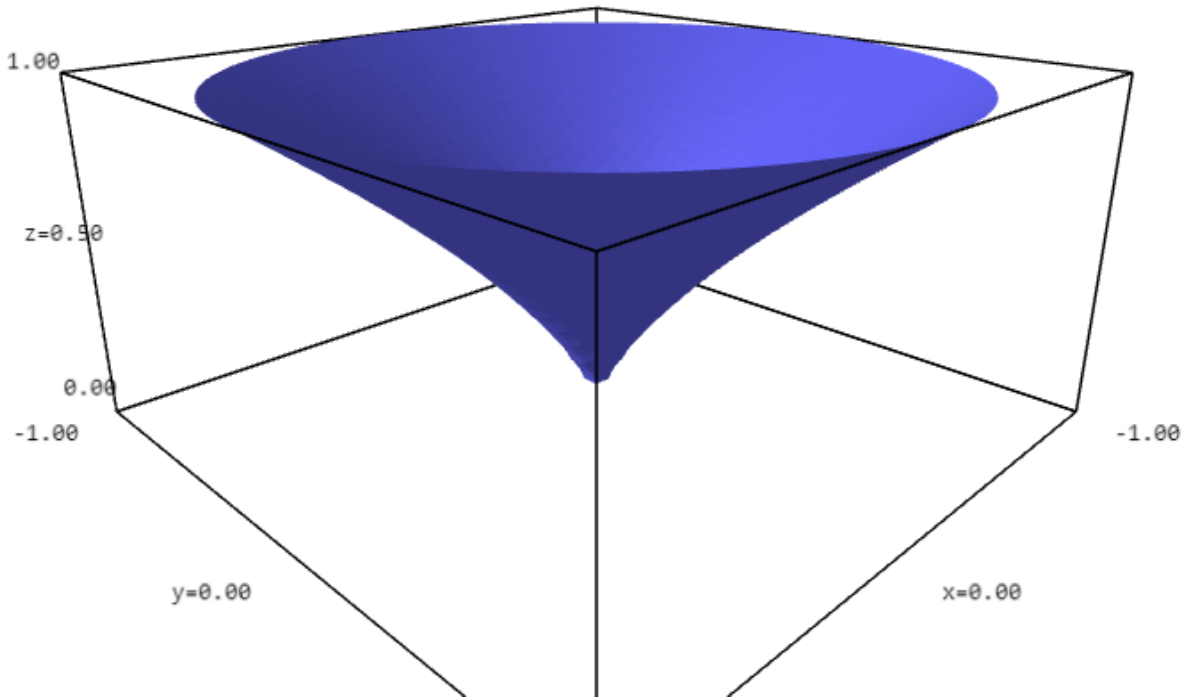
A Surface Implicitly Defined by $z^3 - x^2 - y^2 = 0$



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Three Functions in Two Variables

(x = x(u, v), y = y(u, v), z = z(u, v))

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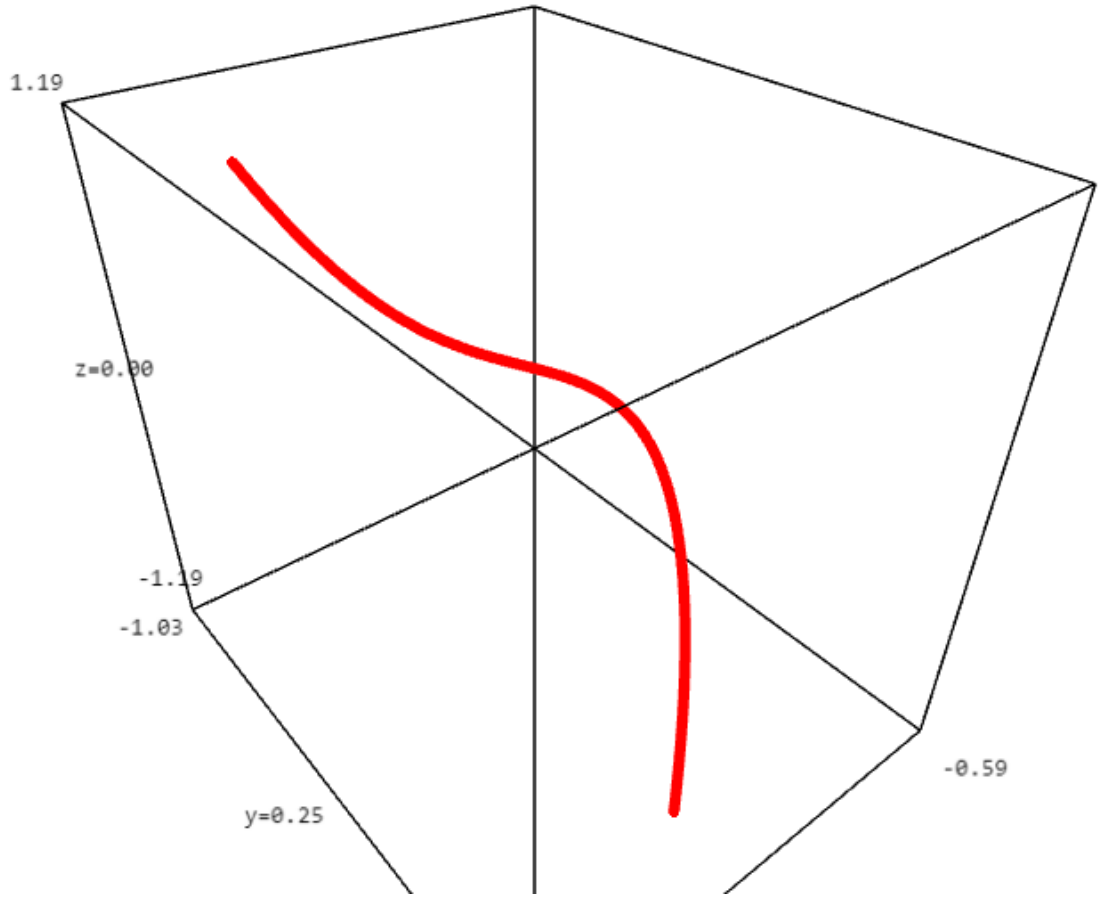
parameter form $(x(t), y(t), z(t))$

The twisted cubic is defined by (t, t^2, t^3).



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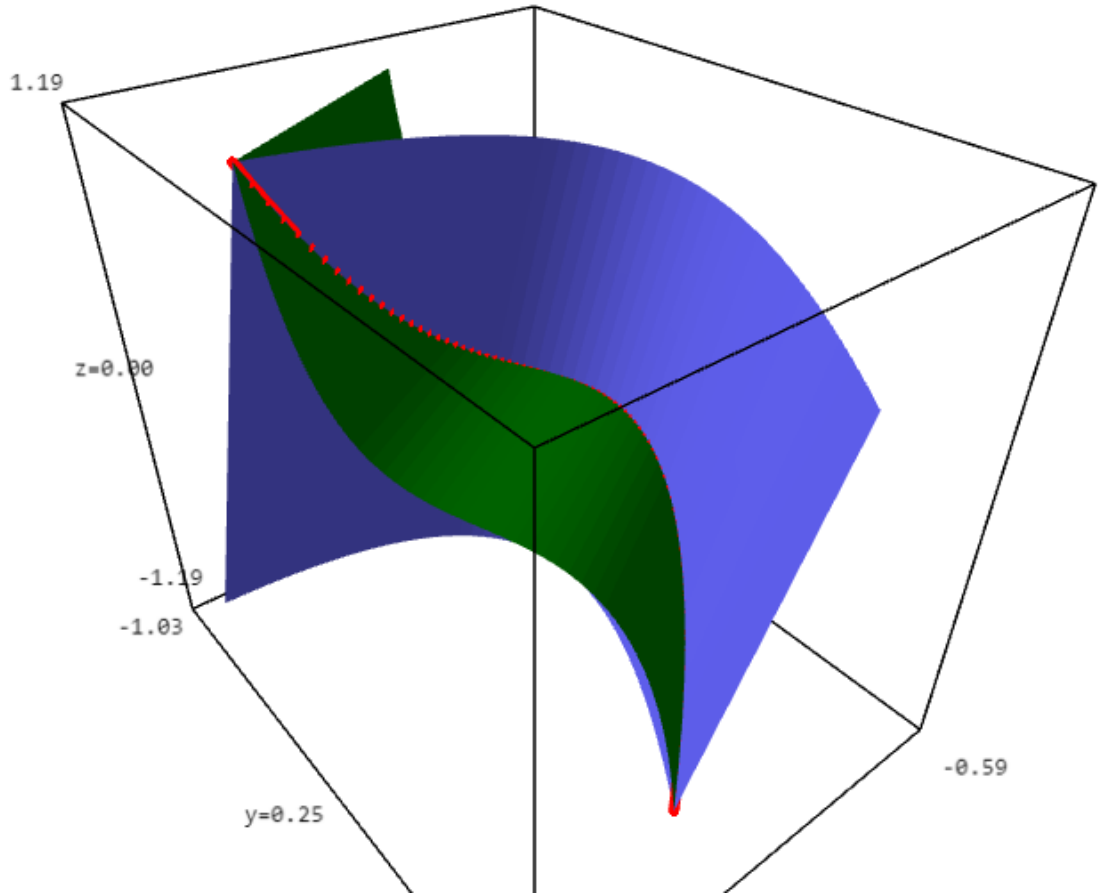
The Intersection of Two Cylinders

The twisted cubic is defined by $x^2 - y = 0$, $x^3 - z = 0$.



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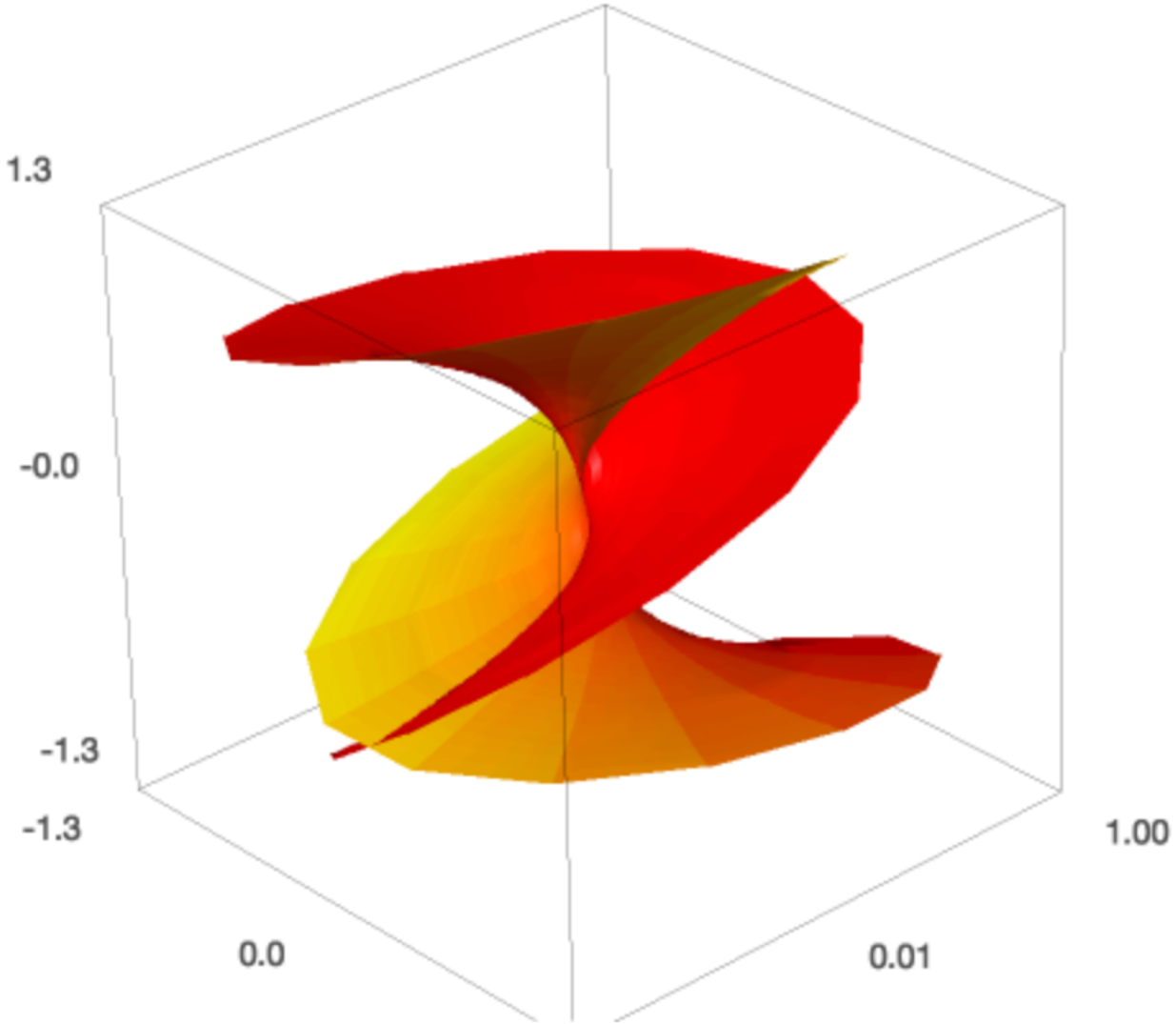
A Riemann Surface of $z = w^3$, $w = u + v\sqrt{-1}$



$z = x + y\sqrt{-1}$, the height of the surface is u, its color is v.