

# Spiraler (5)

## Inspireret af artikel:

"Spirals on surfaces of revolution" af Cristian Lazureanu:

<http://elib.mi.sanu.ac.rs/files/journals/vm/57/vmn57p2-10.pdf>

*restart*

*with(plots) :*

*with(VektorAnalyse4) :*

## Rotation om z-aksen:

[https://en.wikipedia.org/wiki/Rotation\\_matrix#In\\_three\\_dimensions](https://en.wikipedia.org/wiki/Rotation_matrix#In_three_dimensions)

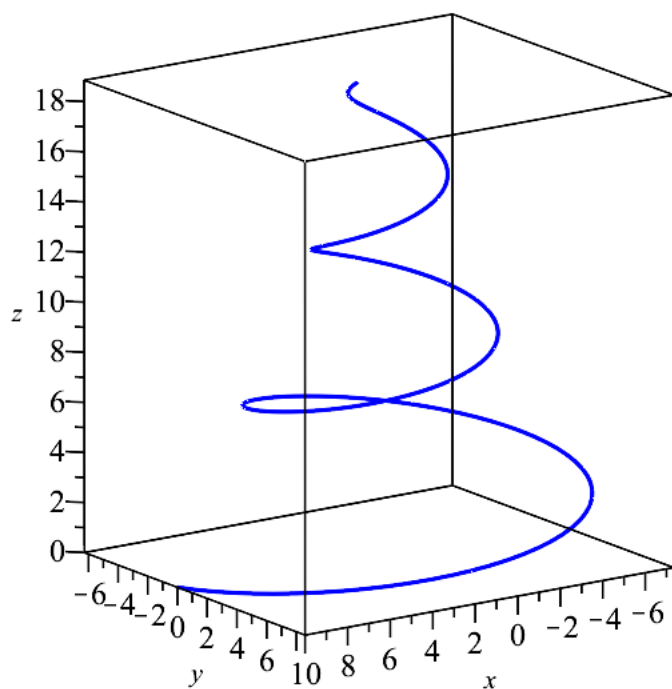
$$R_z(\theta) := \begin{bmatrix} \cos(\theta) & -\sin(\theta) & 0 \\ \sin(\theta) & \cos(\theta) & 0 \\ 0 & 0 & 1 \end{bmatrix} :$$

## ▼ Logaritmisk helix

$$r_9(t) := R_z(t) \cdot \langle \alpha \cdot e^{\beta t}, 0, c \cdot t \rangle :$$

$$r_9(t) = \begin{bmatrix} \cos(t) \alpha e^{\beta t} \\ \sin(t) \alpha e^{\beta t} \\ c t \end{bmatrix}$$

$$R_9 := \text{spacecurve} \left( \left[ \text{vop} \left( \text{subs} \left( \alpha = 10, \beta = -0.1, c = 1, r_9(t) \right) \right) \right], t = 0 .. 2 \cdot \pi \cdot 3, \text{color} = \text{blue}, \text{thickness} = 3, \text{labels} = [x, y, z], \text{scaling} = \text{constrained} \right)$$

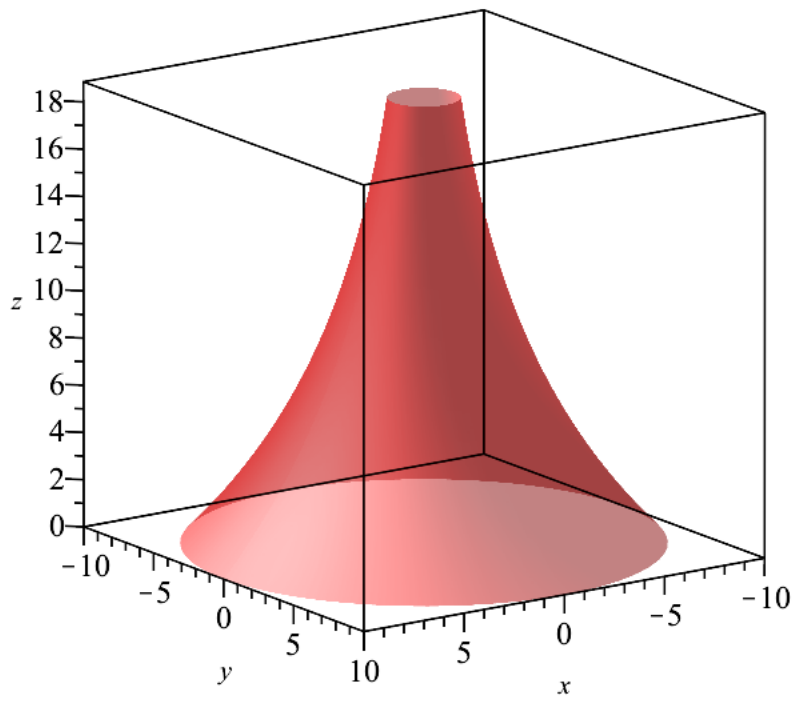


Ekspontiel indhyldningskurve:

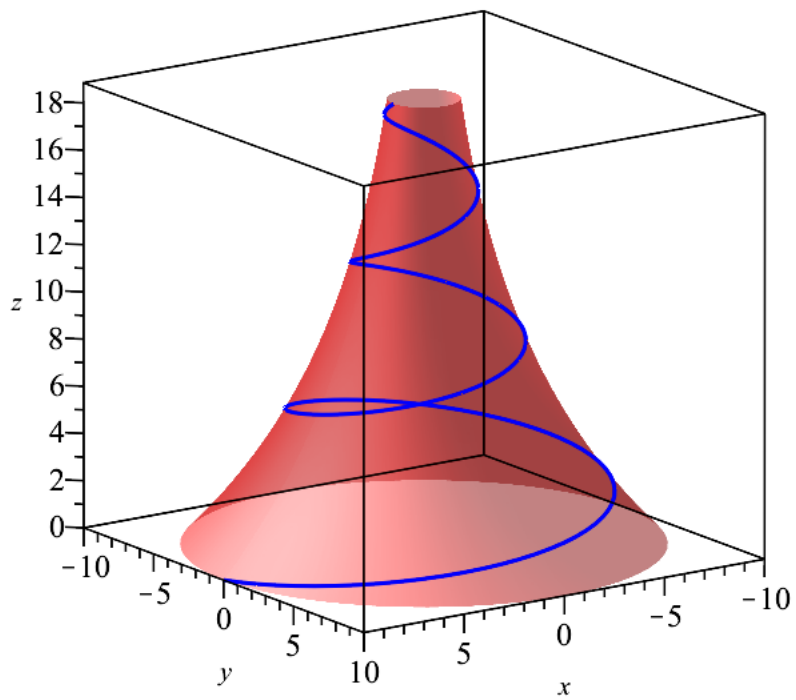
$$r_{\text{logaritmisk}}(u, v) := R_z(v) \cdot \langle \alpha \cdot e^{\beta u}, 0, c \cdot u \rangle :$$

$$r_{\text{logaritmisk}}(u, v) = \begin{bmatrix} \cos(v) \alpha e^{\beta u} \\ \sin(v) \alpha e^{\beta u} \\ c u \end{bmatrix}$$

$$R_{\text{logaritmisk}} := \text{plot3d}(\text{subs}(\alpha = 10, \beta = -0.1, c = 1, r_{\text{logaritmisk}}(u, v)), u = 0 .. 2 \cdot \pi \cdot 3, v = 0 .. 2 \cdot \pi \cdot 3, \text{color} = \text{red}, \\ \text{transparency} = 0.8, \text{labels} = [x, y, z], \text{scaling} = \text{constrained}, \text{numpoints} = 10000, \text{style} = \text{patchnograd})$$



$display(R_9, R_{\text{logaritmsk}})$

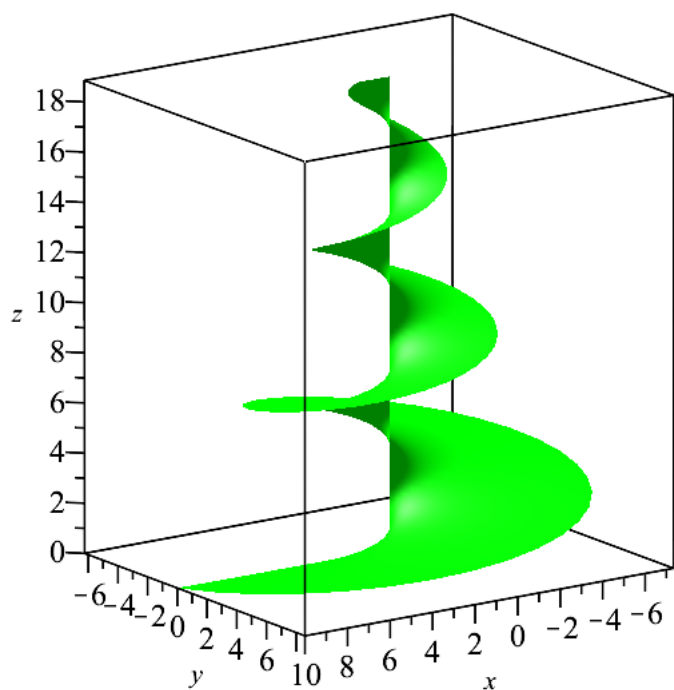


## Logaritmisk heliocoide

$$r_{10}(u, v) := R_z(v) \cdot \langle u \cdot \alpha \cdot e^{\beta v}, 0, c \cdot v \rangle :$$

$$r_{10}(u, v) = \begin{bmatrix} \cos(v) u \alpha e^{\beta v} \\ \sin(v) u \alpha e^{\beta v} \\ c v \end{bmatrix}$$

$R_{10} := \text{plot3d}(\text{subs}(\alpha = 10, \beta = -0.1, c = 1, r_{10}(u, v)), u = 0 .. 1, v = 0 .. 2 \cdot \pi \cdot 3, \text{color} = \text{green}, \text{labels} = [x, y, z], \text{scaling} = \text{constrained}, \text{numpoints} = 10000, \text{style} = \text{patchnograd})$



$\text{display}(R_{10}, R_{\text{logaritmisk}})$

