Spiraler (3)

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

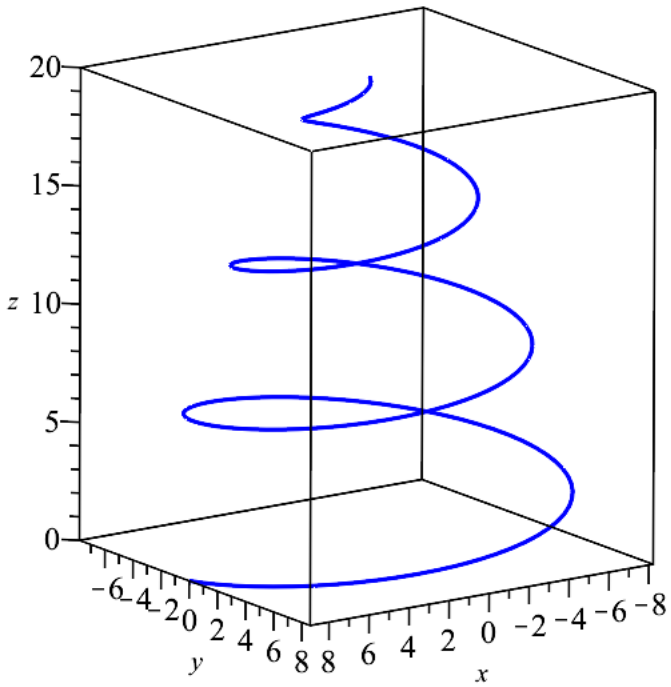
$$R_z(\theta) := \begin{bmatrix} \cos(\theta) & -\sin(\theta) & 0 \\ \sin(\theta) & \cos(\theta) & 0 \\ 0 & 0 & 1 \end{bmatrix}:$$

Parabolsk helix

$$r_5(t) := R_z(t).\langle \alpha\cdot\sqrt{\beta - t}, 0, c\cdot t\rangle :$$

$$r_5(t) = \begin{bmatrix} \cos(t)\ \alpha\sqrt{\beta - t} \\ \sin(t)\ \alpha\sqrt{\beta - t} \\ c\ t \end{bmatrix}$$

```
R5 := spacecurve([vop(subs(α=2, β=20, c=1, r5(t)))], t=0..20, color=blue, thickness=3, labels=[x,
      y, z], scaling=constrained)
```



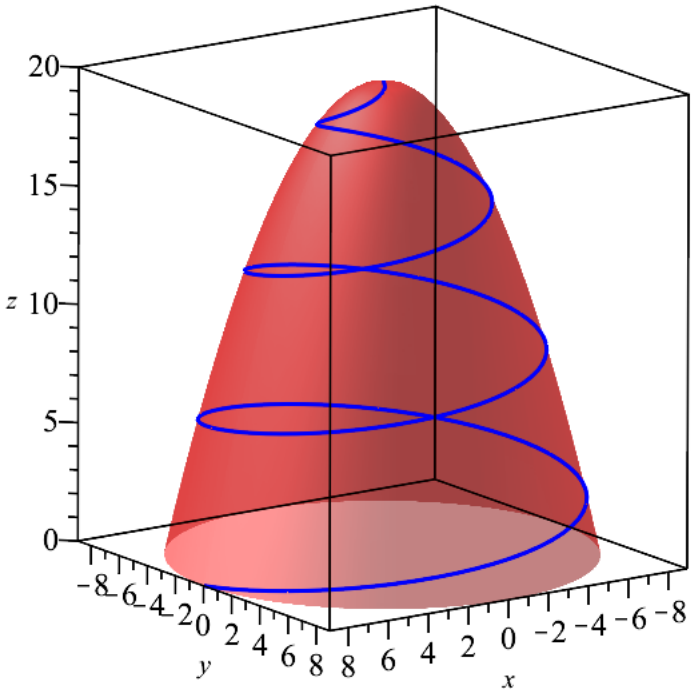
Parabol:

$$r_{parabol}(u, v) := R_z(v).\left\langle \alpha\cdot\sqrt{\beta - u}\,, 0, c\cdot u\right\rangle :$$

$$r_{parabol}(u, v) = \begin{bmatrix} \cos(v)\ \alpha\sqrt{\beta - u} \\ \sin(v)\ \alpha\sqrt{\beta - u} \\ c\ u \end{bmatrix}$$

$$R_{parabol} := plot3d\left(subs\left(\alpha = 2, \beta = 20, c = 1, r_{parabol}(u, v)\right), u = 0..20, v = 0..2\cdot\pi\cdot 3, color = red, transparency = 0.8, labels = [x, y, z], scaling = constrained, numpoints = 10000, style = patchnogrid\right) :$$

$$display\left(R_5, R_{parabol}\right)$$

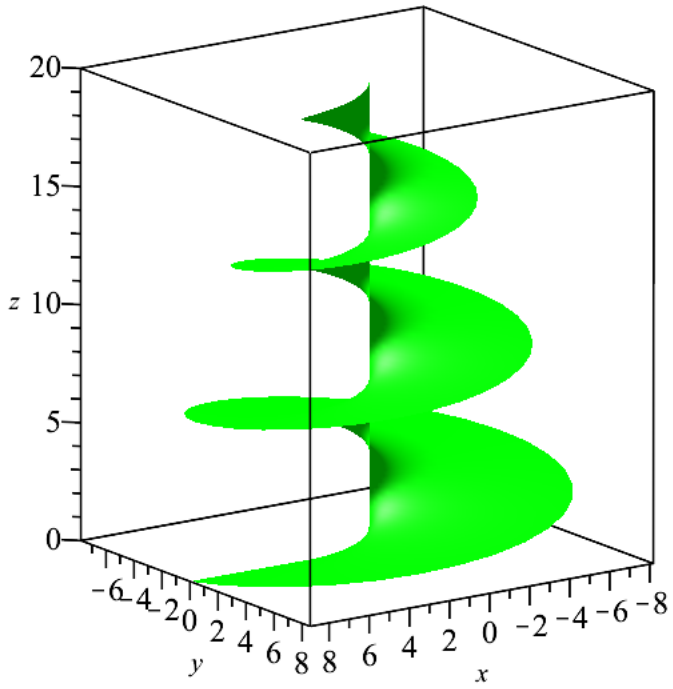


Parabolsk heliocoide

$r_6(u, v) := R_z(v).\langle u \cdot \alpha \cdot \sqrt{\beta - v}, 0, c \cdot v \rangle :$

$$r_6(u, v) = \begin{bmatrix} \cos(v)\, u\, \alpha \sqrt{\beta - v} \\ \sin(v)\, u\, \alpha \sqrt{\beta - v} \\ c\, v \end{bmatrix}$$

$R_6 := plot3d\left(subs\left(\alpha = 2, \beta = 20, c = 1, r_6(u, v)\right), u = 0..1, v = 0..20, color = green, labels = [x, y, z], scaling = constrained, numpoints = 10000, style = patchnogrid\right)$



$display\left(R_6, R_{parabol}\right)$