Analysis 3D, Der Hut und Verwandtes

Mathematik mit MuPAD 4, Prof. Dr. Dörte Haftendorn 02 Update Juni 07

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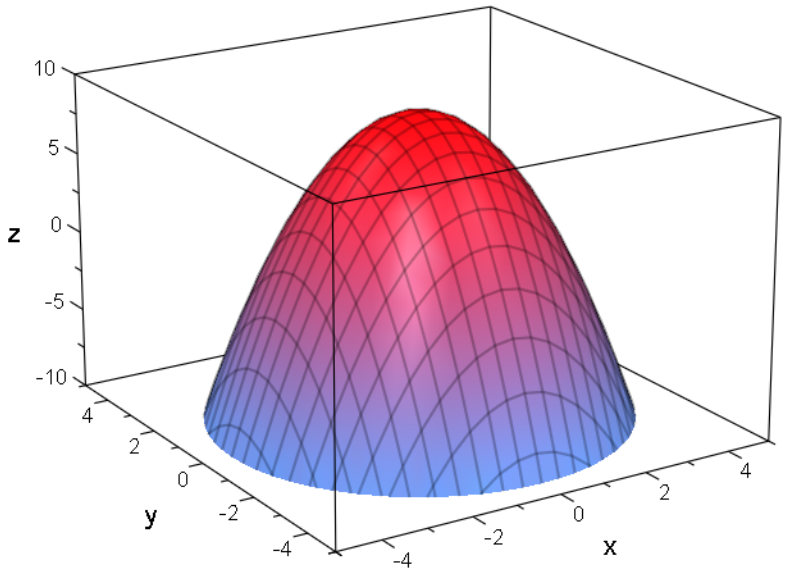
##

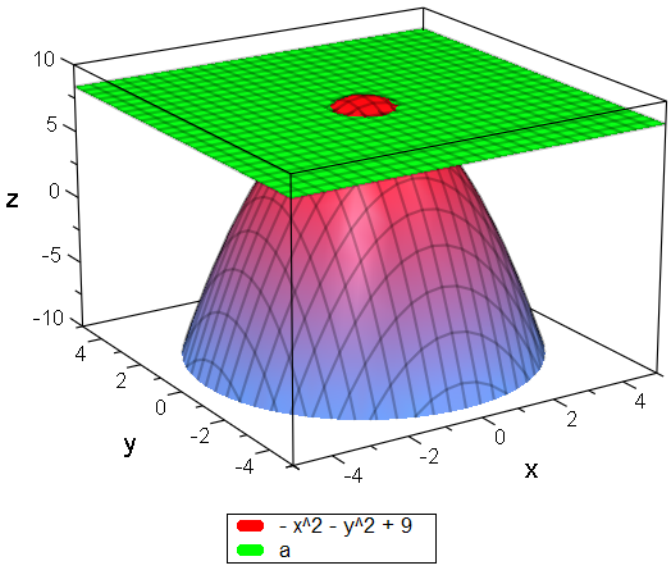
Hut in der Vorlesung, 3D- Lernen

```
plotfunc3d(9-x^2-y^2,x=-5..5,y=-5..5,ViewingBoxZRange=-10..10)
```



Mit Ebene in Höhe a

```
plotfunc3d(9-(x^2+y^2),a,x=-5..5,y=-5..5,a=-10..10,ViewingBoxZRange=-10.
```



animieren durch Anklicken!

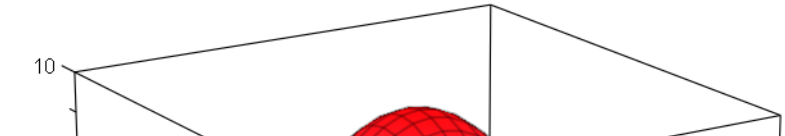
Edlere Ausführung mit beweglichen Kurven

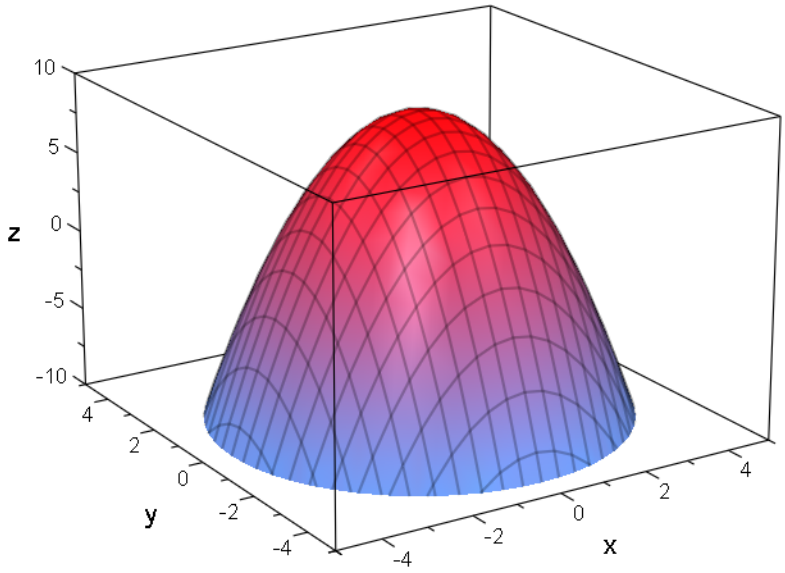
```
hut:=(x,y)->9-(x^2+y^2); hut(x,y)
```

$$(x, y) \to 9 - x^2 - y^2$$

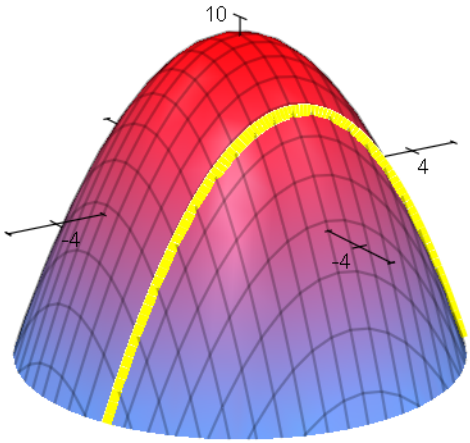
$$-x^2 - y^2 + 9$$

```
hutg:=plot::Function3d(hut(x,y),x=-5..5,y=-5..5,ViewingBoxZRange=-10..10):
plot(hutg)
```




```
schnittezy:=plot::Curve3d([x,y,hut(x,y)],x=-5..5,y=-3..3,
            LineWidth=2,LineColor=[1,1,0], Axes=Origin):
plot(schnittezy,hutg)
```

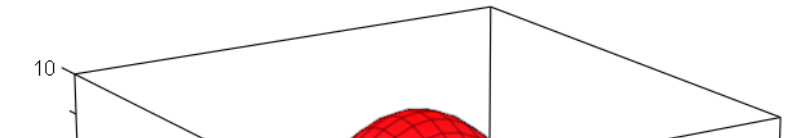


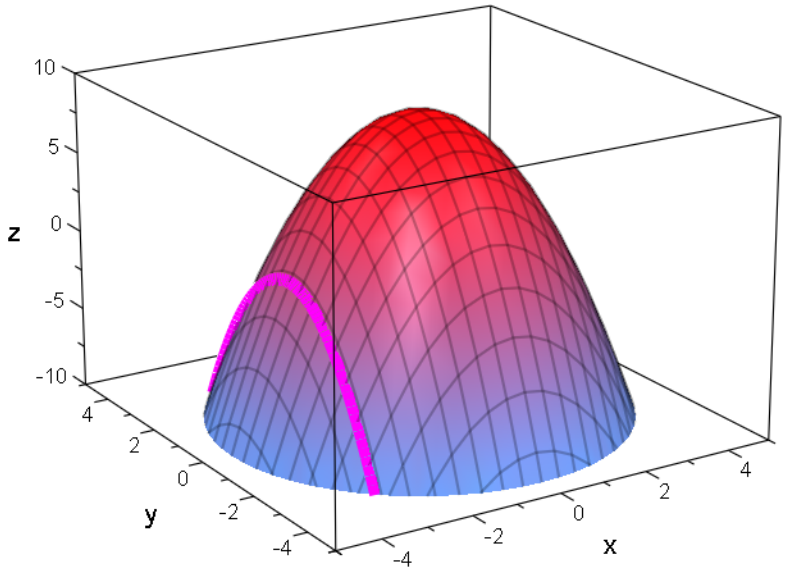
animieren durch Anklicken!

```
schnittezx:=plot::Curve3d([x,y,hut(x,y)],y=-5..5,x=-3..3,
            LineWidth=2,LineColor=[1,0,1])
```

$$\text{plot::Curve3d}([x,\ y,\ -x^2-y^2+9],\ y=-5..5)$$

```
plot(hutg, schnittezx)
```

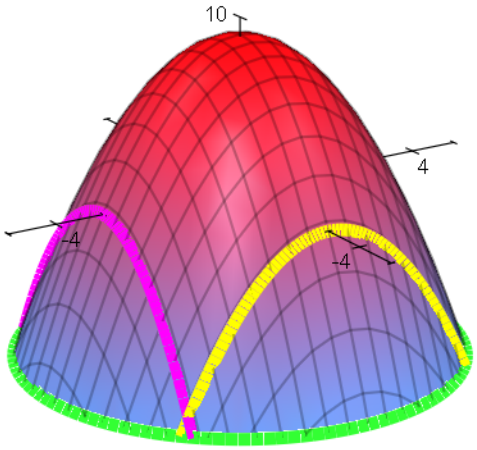






```
r:=a->sqrt(9-a):rr:=5:
schnittexy:=plot::Curve3d([r(a)*cos(t),r(a)*sin(t),a],t=0..2*PI,a=-10..9
            LineWidth=2,LineColor=[0.2,1,0.2])
```

$$\text{plot::Curve3d}\left(\left[\cos(t)\cdot\sqrt{-a+9},\ \sin(t)\cdot\sqrt{-a+9},\ a\right],\ t=0..2\cdot\pi\right)$$

```
plot(schnittexy,hutg,schnittezx, schnittezy)
```



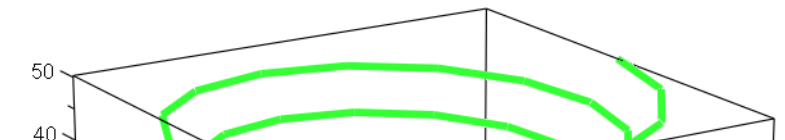

```
schraubetoll:=plot::Curve3d([r(a)*cos(t),r(a)*sin(t),a*t],t=0..6*PI,a=-10..9,
            LineWidth=2,LineColor=[0.2,1,0.2])
```

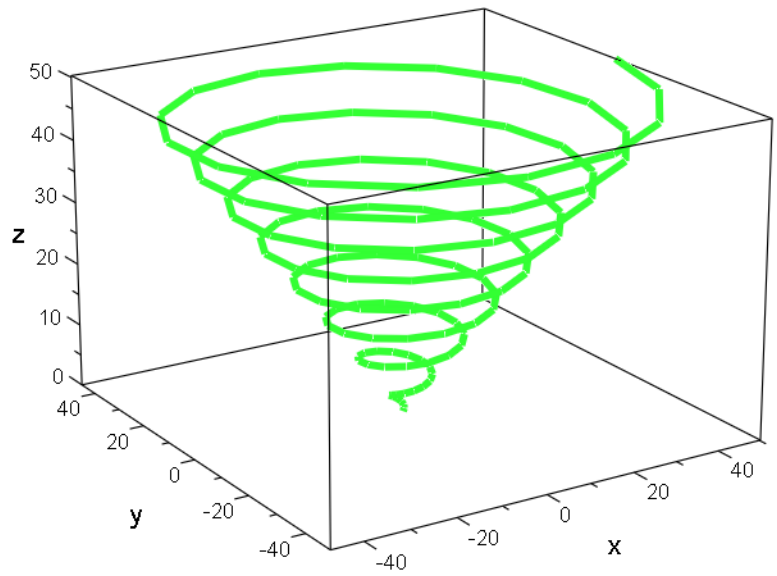
$$\text{plot::Curve3d}\left(\left[\cos(t)\cdot\sqrt{-a+9},\ \sin(t)\cdot\sqrt{-a+9},\ a\cdot t\right],\ t=0..6\cdot\pi\right)$$

```
rr:=4:   schraube:=plot::Curve3d([t*cos(t),t*sin(t),t],t=0..a,a=16*PI..0,
            LineWidth=1,LineColor=[0.2,1,0.2],
AnimationStyle=BackAndForth)
```

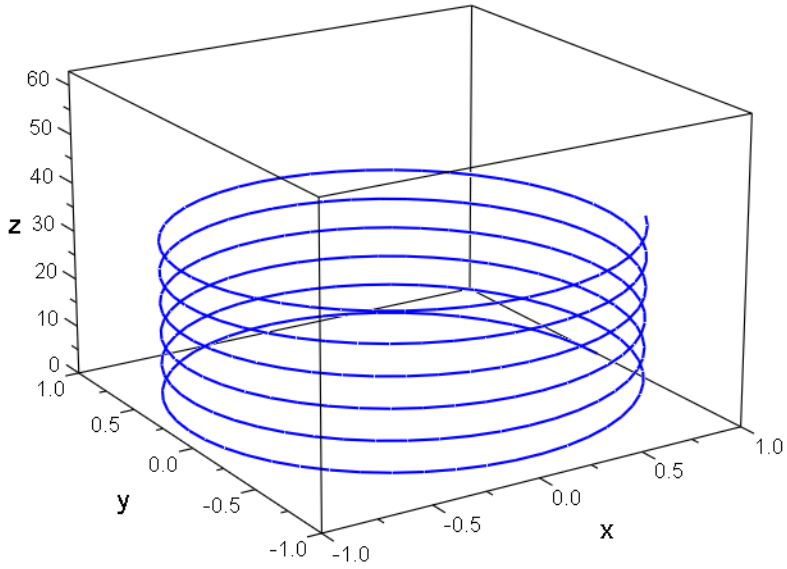
$$\text{plot::Curve3d}\left(\left[t\cdot\cos(t),\ t\cdot\sin(t),\ t\right],\ t=0..a\right)$$

```
plot(schraube)
```

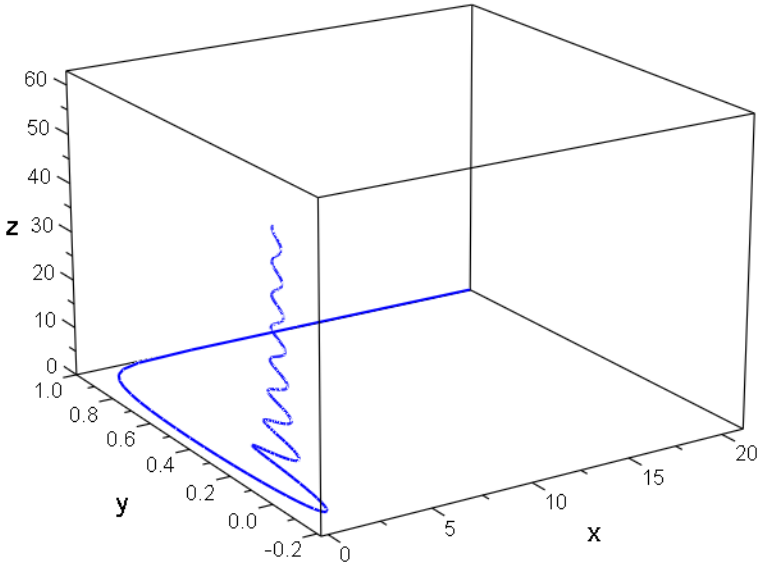





```
billig:=plot::Curve3d([cos(t),sin(t),t],t=0..a, a=0..20*PI,Mesh=300):plo
```

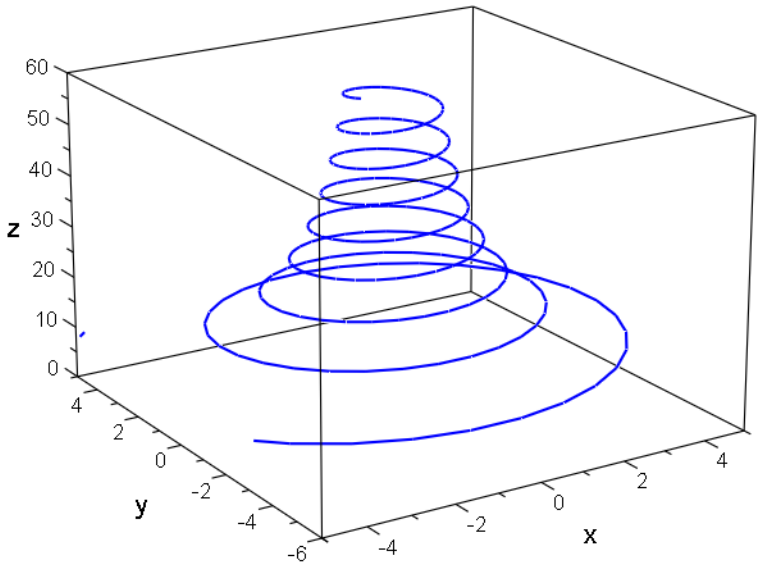



```
indien:=plot::Curve3d([1/t*cos(t),1/t*sin(t),t],t=0..a, a=0..20*PI,Mesh=
```




```
Tanne:=plot::Curve3d([60/t*cos(t),60/t*sin(t),t],t=0.3..a, a=0..20*PI,Me
```

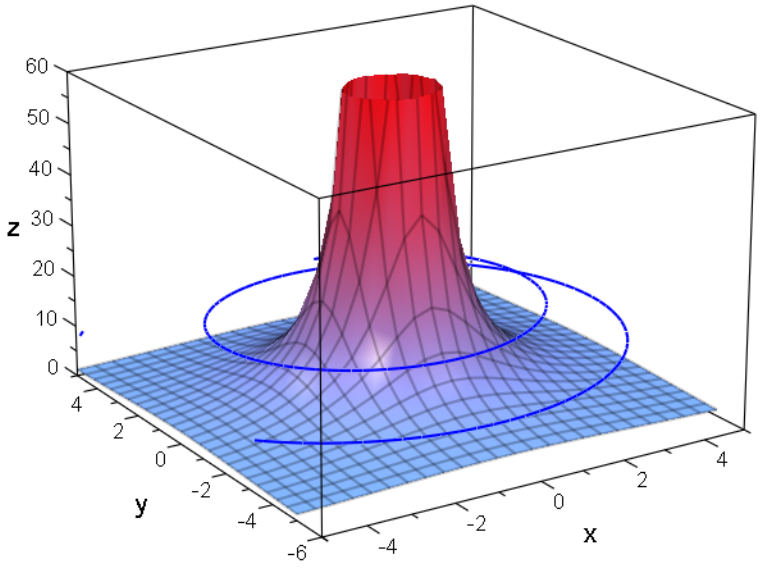
```
ViewingBox=[-5..5,-6..5,0..60]
):plot(Tanne)
```



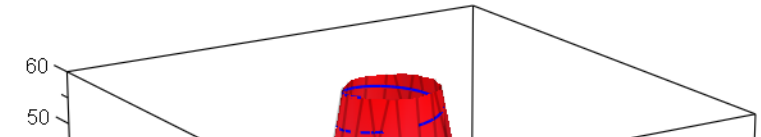

```
Schornstein:=plot::Function3d((60/(x^2+y^2)),x=-5..5,y=-5..5,ViewingBoxZ
```

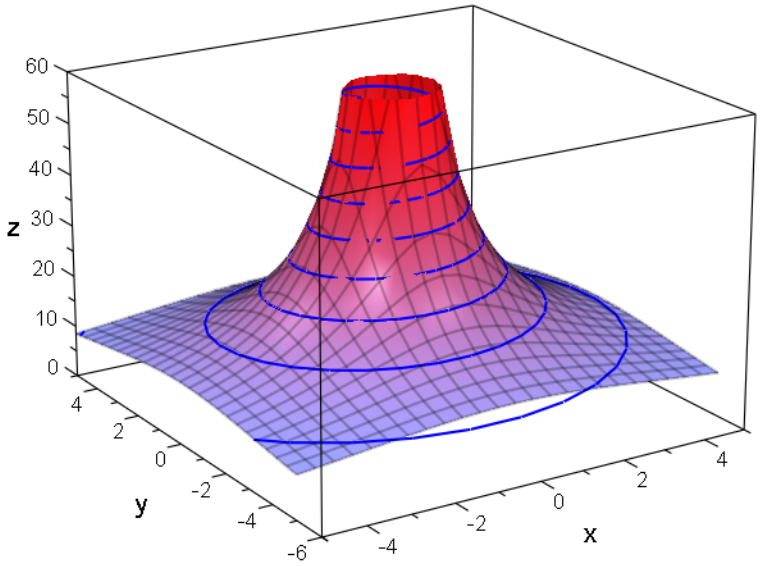
$$\text{plot::Function3d}\left(\frac{60}{x^2+y^2},\ x=-5..5,\ y=-5..5\right)$$

```
plot(Schornstein,Tanne)
```




```
Schornstein2:=plot::Function3d((60/sqrt(x^2+y^2)),x=-5..5,y=-5..5,ViewingBoxZRang
plot(Schornstein2,Tanne)
```


60
50
40
z 30
20
10
0
4
2
0
-2
-4
-6
y
-4
-2
0
2
4
x