

Rovnice kvadriky - maticový zápis

```
[ > restart;
[ > with(LinearAlgebra):
[ > X:=Vector[row]([x,y,z,1]);
                                     X := [x, y, z, 1]
[ > K:=Matrix(a,1..4,1..4,shape=symmetric);
                                     K :=  $\begin{bmatrix} a(1,1) & a(1,2) & a(1,3) & a(1,4) \\ a(1,2) & a(2,2) & a(2,3) & a(2,4) \\ a(1,3) & a(2,3) & a(3,3) & a(3,4) \\ a(1,4) & a(2,4) & a(3,4) & a(4,4) \end{bmatrix}$ 
[ > RovKv:=X.K.Transpose(X)=0;
RovKv := x (x a(1, 1) + y a(1, 2) + z a(1, 3) + a(1, 4))
      + y (x a(1, 2) + y a(2, 2) + z a(2, 3) + a(2, 4))
      + z (x a(1, 3) + y a(2, 3) + z a(3, 3) + a(3, 4)) + x a(1, 4) + y a(2, 4) + z a(3, 4) + a(4, 4) =
      0
[ > RovKv:=expand(RovKv);
RovKv := x2 a(1, 1) + 2 x y a(1, 2) + 2 x z a(1, 3) + 2 x a(1, 4) + y2 a(2, 2) + 2 y z a(2, 3)
      + 2 y a(2, 4) + z2 a(3, 3) + 2 z a(3, 4) + a(4, 4) = 0
[ > RovKv:=sort(RovKv,[x,y,z],tdeg);
RovKv := a(1, 1) x2 + 2 a(1, 2) x y + 2 a(1, 3) x z + a(2, 2) y2 + 2 a(2, 3) y z + a(3, 3) z2
      + 2 a(1, 4) x + 2 a(2, 4) y + 2 a(3, 4) z + a(4, 4) = 0
```

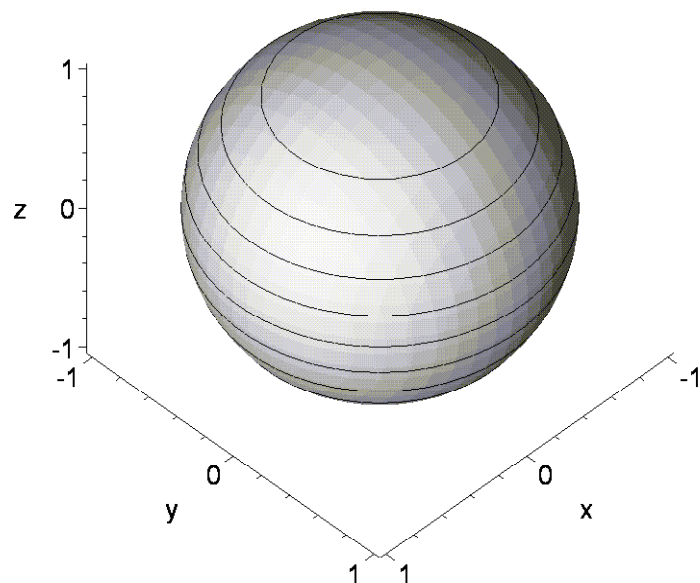
Zobrazení kvadriky

Kv1: Kulová plocha

```
[ > restart;
[ > Kv1:=x^2+y^2+z^2-1=0;
                                     Kv1 := x2 + y2 + z2 - 1 = 0
```

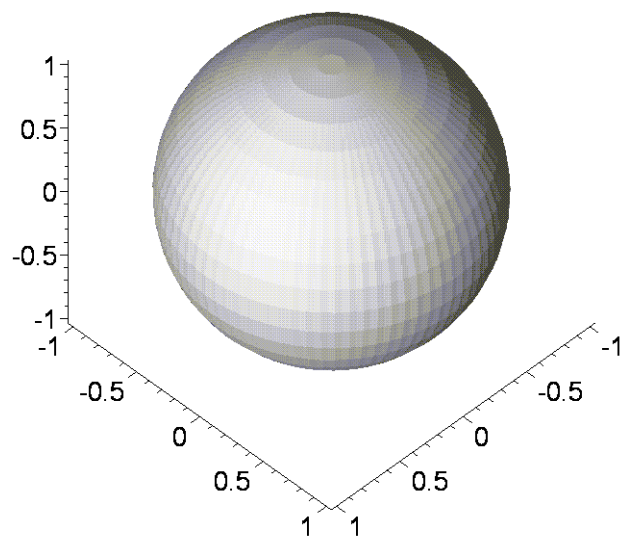
Zobrazení plochy dané rovnicí užitím plots[implicitplot]

```
[ > plots[implicitplot3d](Kv1,x=-1..1,y=-1..1,z=-1..1,axes=frame,color=COLOR(
RGB,204/255,204/255,204/255),style=patchcontour,grid=[20,20,20],light=[100,-20,1,1,1],tickmarks=[3,3,3]);
```



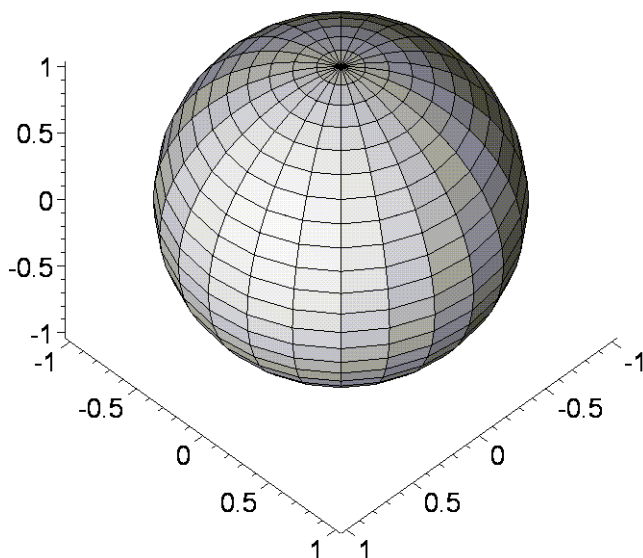
Zobrazení parametrického vyjádření plochy užitím **plot3d**

```
> Sph:=plot3d([sin(u)*cos(t),sin(u)*sin(t),cos(u)],t=-Pi..Pi,u=-Pi
..Pi,grid=[40,40],style=patchnogrid):
> plots[display](Sph,scaling=constrained,color=COLOR(204/255,204/255,204/255),light=[100,-20,1,1,1],axes=frame);
```



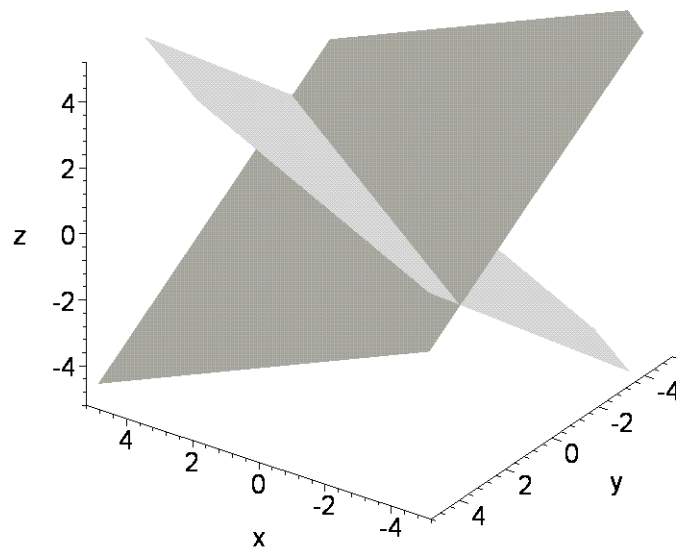
Zobrazení kulové plochy užitím příkazu **sphere** z balíčku **plottools**

```
[ > Sph2:=plottools[sphere]([0,0,0],1):  
> plots[display](Sph2,scaling=constrained,color=COLOR(204/255,  
204/255,204/255),light=[100,-20,1,1,1],axes=frame);
```



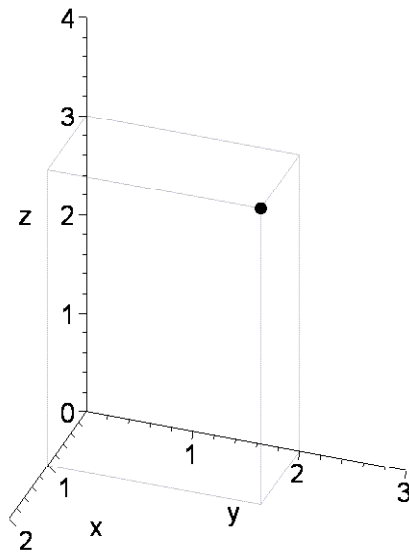
Kv2: Dvě roviny

```
[ > restart;  
> Kv2:=(2*x+3*y-4*z+1)*(3*x+4*y+7*z-3)=0;  
Kv2 := (2 x + 3 y - 4 z + 1) (3 x + 4 y + 7 z - 3) = 0  
> op(lhs(Kv2));  
2 x + 3 y - 4 z + 1, 3 x + 4 y + 7 z - 3  
> plots[implicitplot3d]([op(lhs(Kv2))],x=-5..5,y=-5..5,z=-5..5,ori  
entation=[125,60],gridstyle=rectangular,axes=frame,grid=[10,10,1  
0],style=patchnogrid,color=[COLOR(204/255,204/255,204/255),C  
OLOR(153/255,153/255,153/255)]);
```



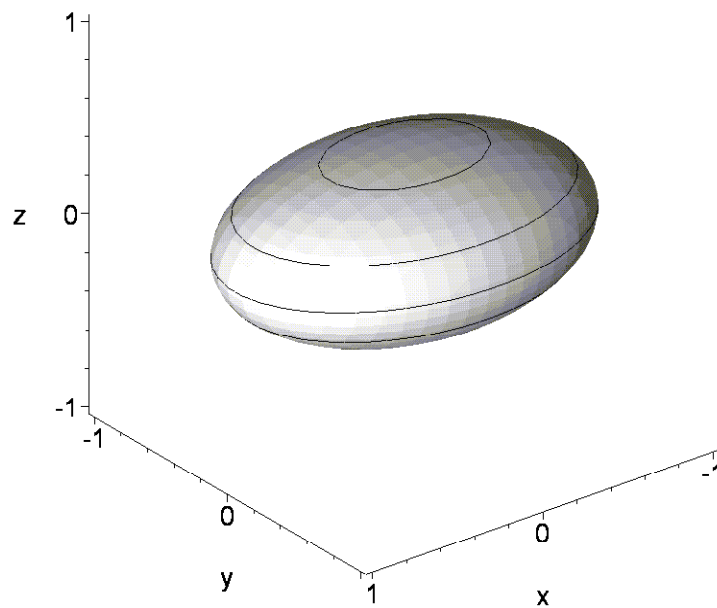
Kv3: Bod

```
[ > restart;
[ > Kv3:=(x-1)^2+(y-2)^2+(z-3)^2=0;
      Kv3 := (x-1)2 + (y-2)2 + (z-3)2 = 0
[ > Bod:=plottools[sphere]([1,2,3],0.05,color=black):
[ > Kvadr:=plottools[cuboid]([0,0,0],[1,2,3],style=wireframe,color=grey):
[ > plots[display](Bod,
      Kvadr,axes=normal,orientation=[20,60],tickmarks=[2,3,4],scaling=
      constrained,view=[0..2,0..3,0..4],labels=[x,y,z]);
```



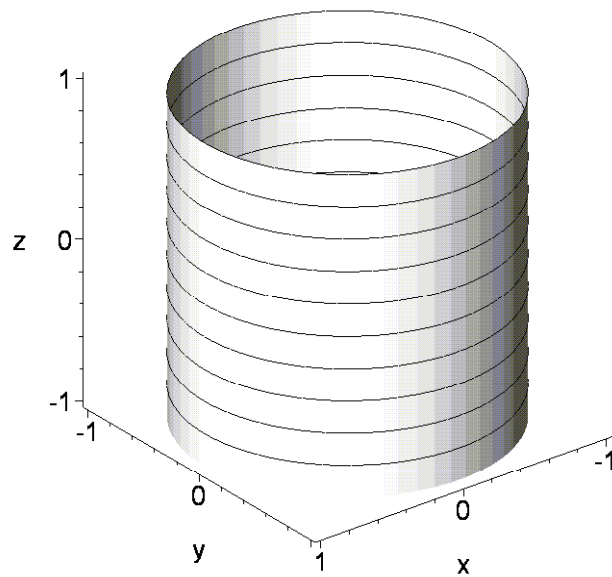
Kv5: Elipsoid

```
[ > restart;
  > Kv5:=x^2+2*y^2+5*z^2-1=0;
      Kv5 := x2 + 2 y2 + 5 z2 - 1 = 0
  > plots[implicitplot3d](Kv5,x=-1..1,y=-1..1,z=-1..1,axes=frame,color=COLOR(
  RGB,250/255,250/255,250/255),style=patchcontour,grid=[20,20,40],light=[100,-20,1,1,1],tickmarks=[3,3,3],orientation=[52,63],scaling=constrained);
```



Kv6: Válcová plocha

```
[ > restart;
[ > Kv6:=x^2+y^2-1=0;
                                Kv6 := x2 + y2 - 1 = 0
[ > plots[implicitplot3d](Kv6,x=-1..1,y=-1..1,z=-1..1,axes=frame,color=COLOR(
RGB,250/255,250/255,250/255),style=patchcontour,grid=[20,20,40],light=[100,-20,1,1,1],tickmarks=[3,3,3],orientation=[52,63],scaling=constrained);
```



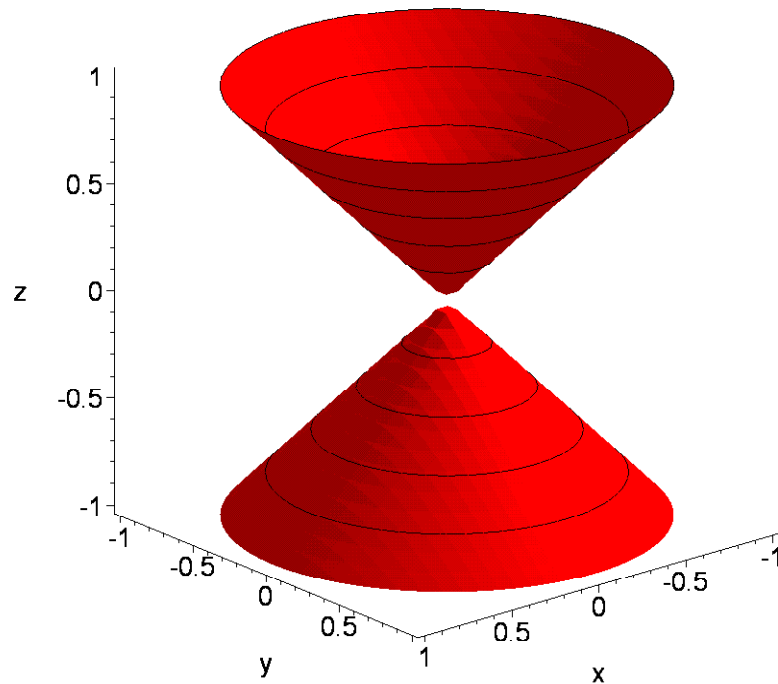
Kv7: Kuželová plocha

```
[ > restart;  
  > Kv7:=x^2+y^2-z^2=0;
```

$$Kv7 := x^2 + y^2 - z^2 = 0$$

Zobrazení kuželové plochy užitím příkazu `plots[implicitplot]`

```
[ > plots[implicitplot3d](Kv7,x=-1..1,y=-1..1,z=-1..1,grid=[30,30,30]  
  ],axes=frame,orientation=[50,70],style=patchcontour,color=red,li  
  ghtmodel=light1,scaling=constrained);
```

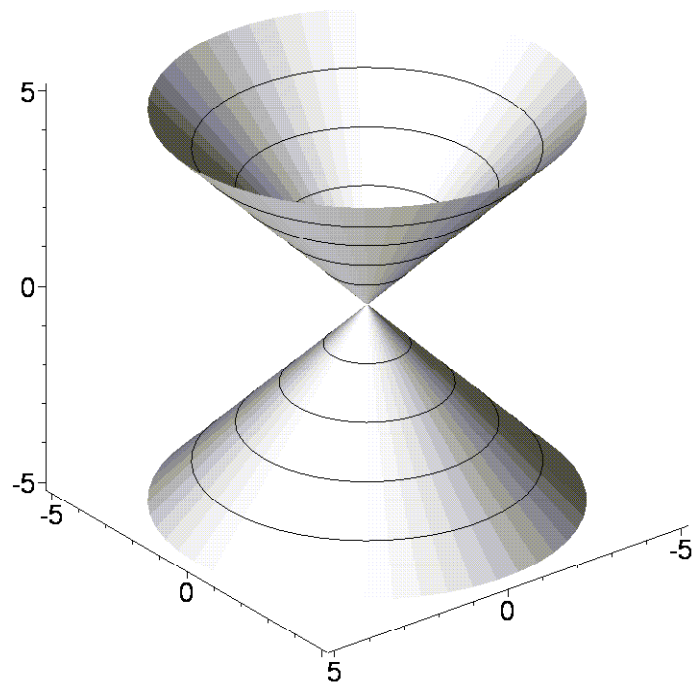


Zobrazení parametrického vyjádření kuželové plochy užitím příkazu **plot3d**

```

> Kv7p:=subs(x=t*cos(u),y=t*sin(u),Kv7);
          Kv7p := t2 cos(u)2 + t2 sin(u)2 - z2 = 0
> Res_z:=solve(Kv7p,{z});
          Res_z := {z = -t}, {z = t}
> Kv7p[1]:=eval([t*cos(u),t*sin(u),z],Res_z[1]);
Kv7p[2]:=eval([t*cos(u),t*sin(u),z],Res_z[2]);
          Kv7p1 := [t cos(u), t sin(u), -t]
          Kv7p2 := [t cos(u), t sin(u), t]
> plot3d({Kv7p[1],Kv7p[2]},t=0..5,u=0..2*Pi,orientation=[52,63],gr
id=[50,50],style=patchcontour,axes=frame,color=COLOR(RGB,250/255
,250/255,250/255),light=[100,-20,1,1,1],tickmarks=[3,3,3],scalin
g=constrained);

```

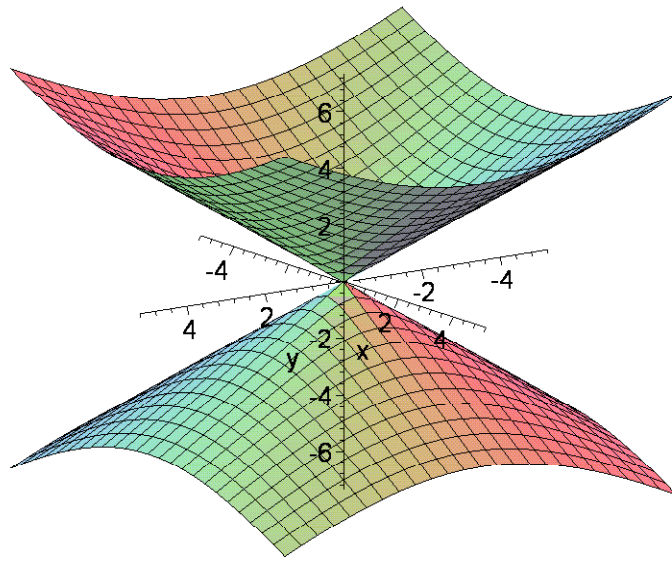



Zobrazení kuželové plochy jako dvou funkcí o dvou proměnných

```
> Kv7_2:=solve(Kv7,z);
```

$$Kv7_2 := \sqrt{x^2 + y^2}, -\sqrt{x^2 + y^2}$$

```
> plot3d({Kv7_2},x=-5..5,y=-5..5,axes=normal,orientation=[55,75],color=grey,lightmodel=light1);
```



[>