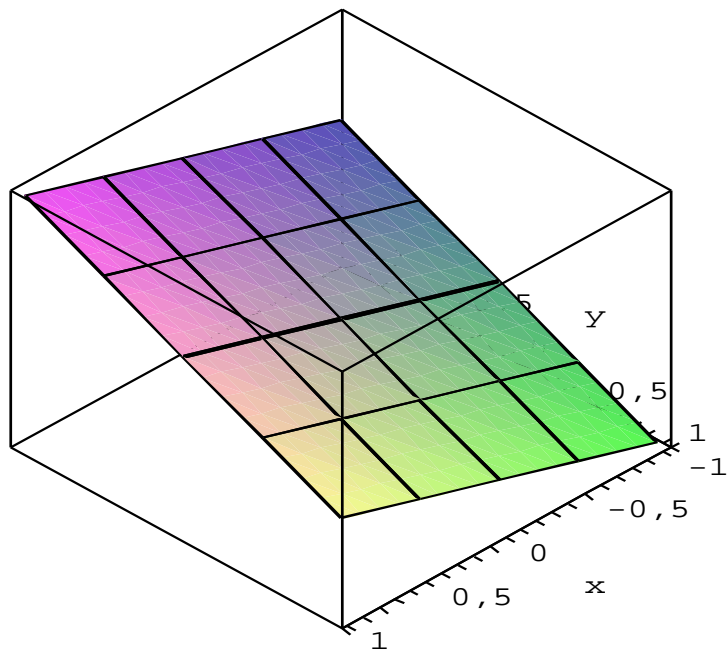


# 1 Grafy funkcí

```
> f1:=(x,y)->2*x-3*y+1;
```

$$f1 := (x, y) \mapsto 2x - 3y + 1$$

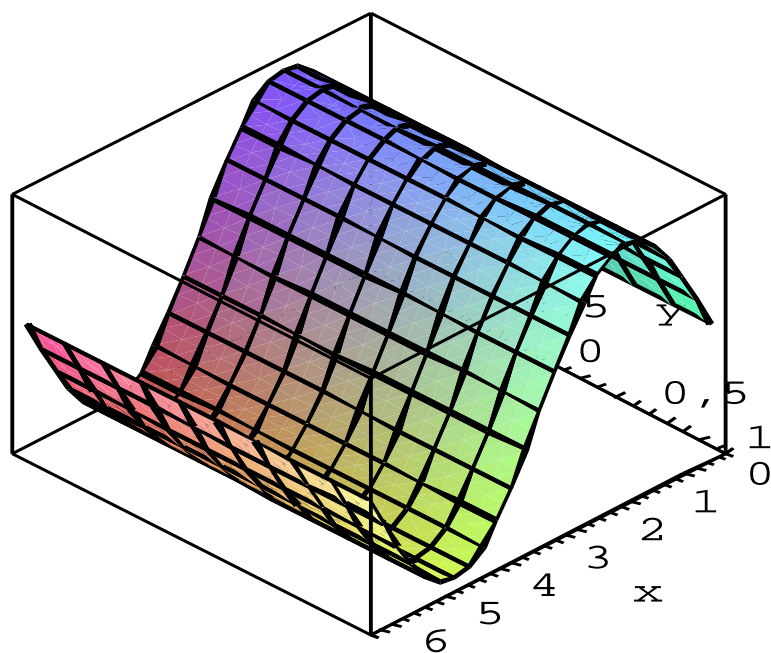
```
> plot3d(f1(x,y), x=-1..1, y=-1..1, axes=boxed, grid=[5,5]);
```



```
> f2:=(x,y)->sin(x);
```

$$f2 := (x, y) \mapsto \sin(x)$$

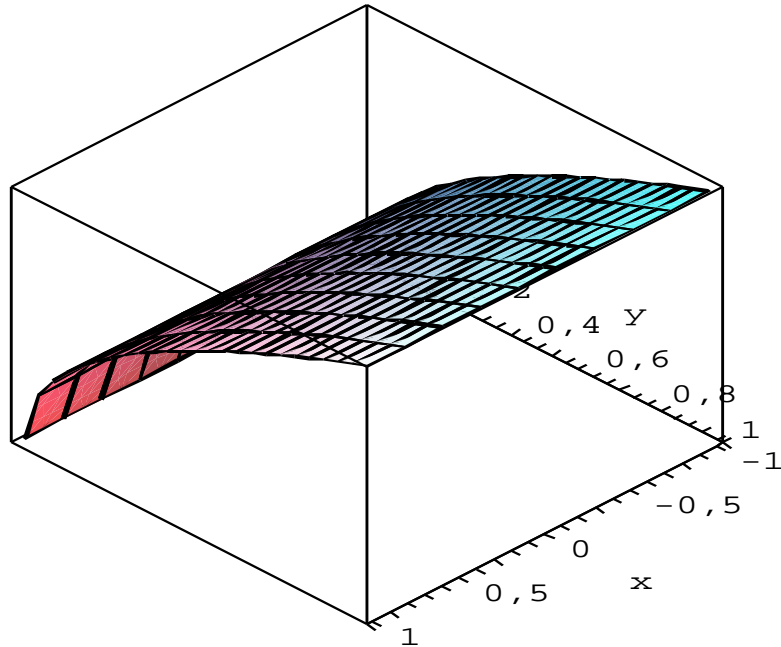
```
> plot3d(f2(x,y), x=0..2*Pi, y=-1..1, axes=boxed, grid=[25,10]);
```



```
> f3:=(x,y)->sqrt(y);
```

$$f3 := (x, y) \mapsto \sqrt{y}$$

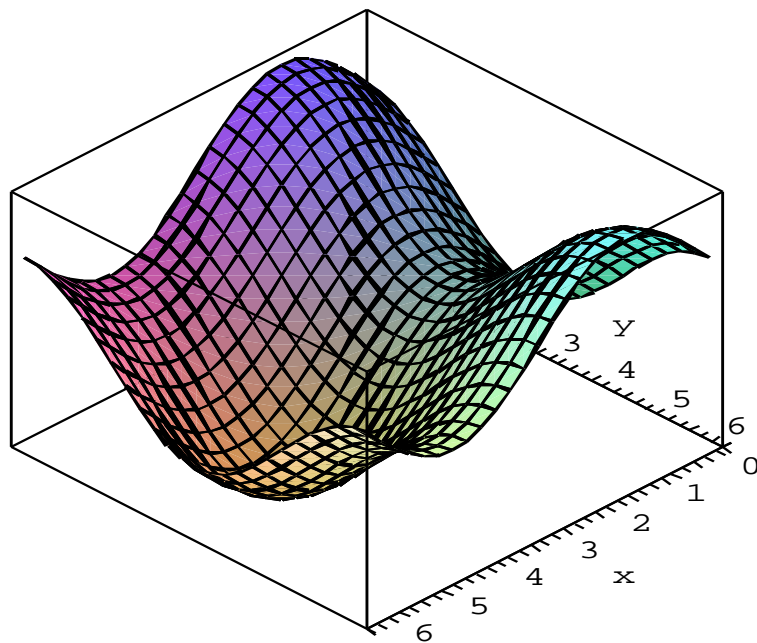
```
> plot3d(f3(x,y), x=-1..1, y=0..1, axes=boxed, grid=[10,25]);
```



```
> f4:=(x,y)->sin(x)+cos(y);
```

$$f4 := (x, y) \mapsto \sin(x) + \cos(y)$$

```
> plot3d(f4(x,y), x=0..2*Pi, y=0..2*Pi, axes=boxed);
```

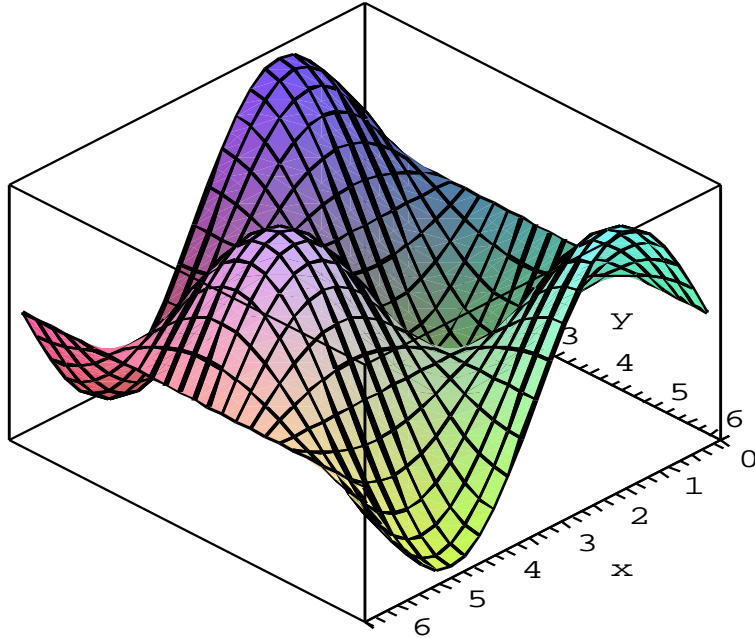


```
> f5:=(x,y)->sin(x)*cos(y);
```

```

f5 := (x,y) ↦ sin(x) cos(y)
> plot3d(f5(x,y), x=0..2*Pi, y=0..2*Pi, axes=boxed);

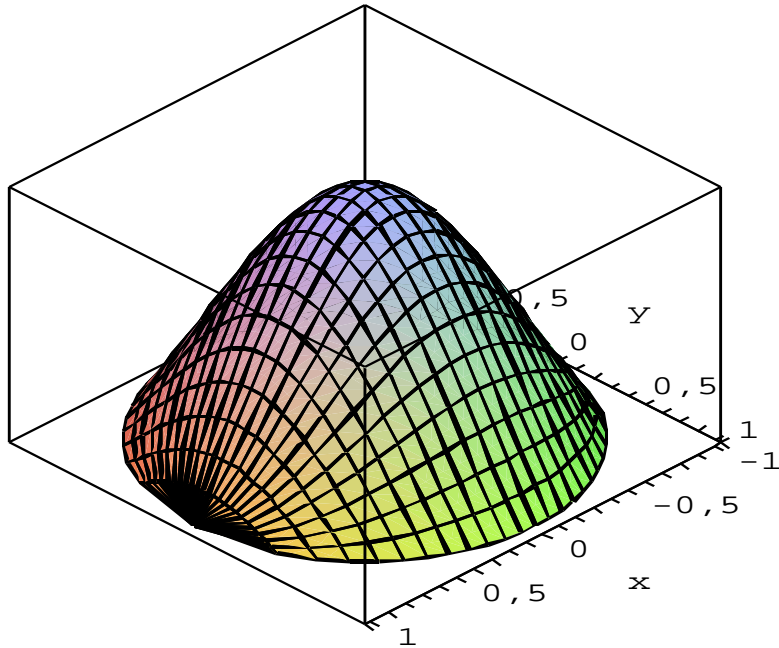
```



```

> f6:=(x,y)->exp(-(x^2+y^2));
f6 := (x,y) ↦ e-x2-y2
> plot3d(f6(x,y), x=-1..1, y=-sqrt(1-x^2)..sqrt(1-x^2), axes=boxed);

```

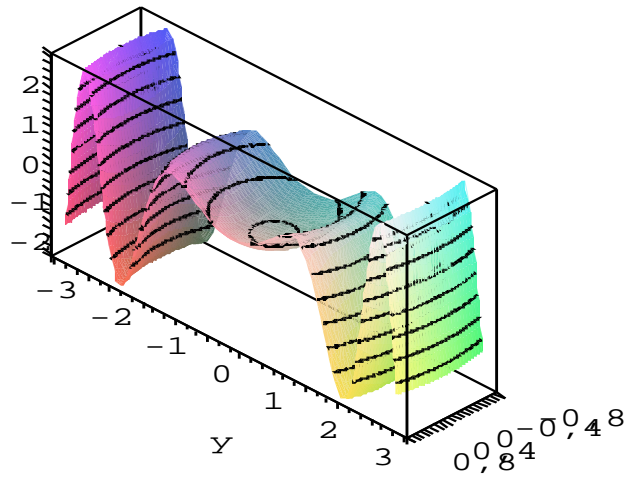


```

> f7:=(x,y)->sqrt(x^2+y^2)*sin(x^2+y^2);
f7 := (x,y) ↦ √(x2+y2) sin(x2+y2)

```

```
> plot3d(f7(x,y), x=-Pi/4..Pi/4, y=-sqrt(Pi^2-x^2)..sqrt(Pi^2-x^2), axes=boxed,
grid=[60,60], style=patchcontour, scaling=constrained);
```

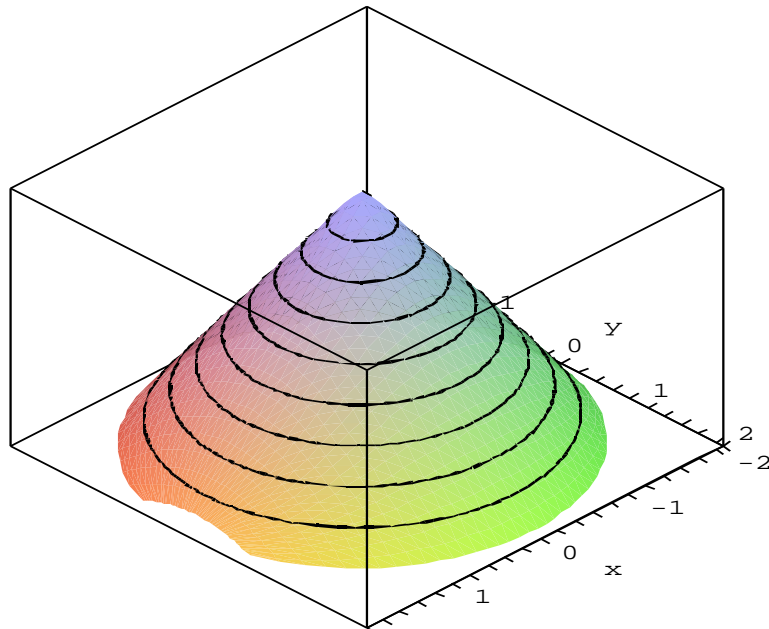


x

```
> f8:=(x,y)->2-sqrt(x^2+y^2);
```

$$f8 := (x, y) \mapsto 2 - \sqrt{x^2 + y^2}$$

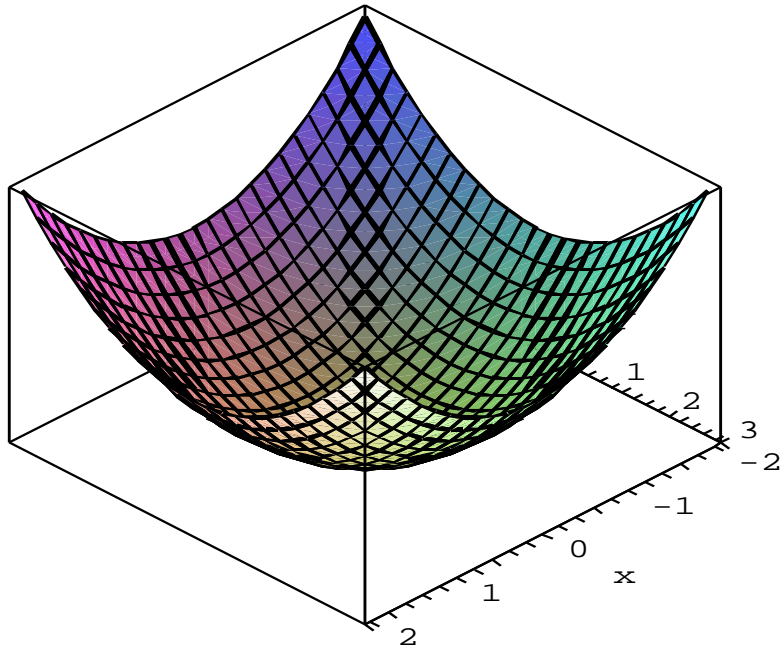
```
> plot3d(f8(x,y), x=-2..2, y=-sqrt(4-x^2)..sqrt(4-x^2), axes=boxed, style=patchcontour,
grid=[40,40]);
```



```
> f9:=(x,y)->(x^2)/4+(y^2)/9;
```

$$f9 := (x, y) \mapsto 1/4x^2 + 1/9y^2$$

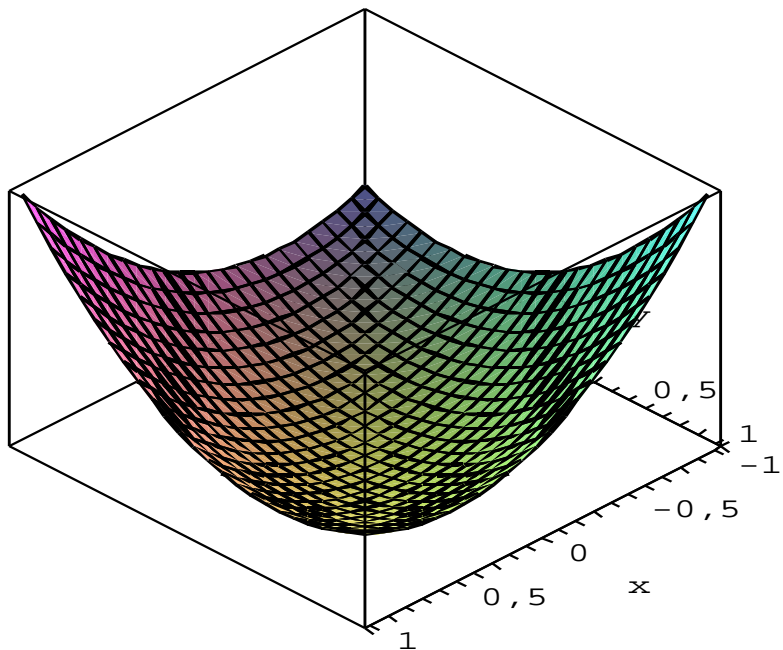
```
> plot3d(f9(x,y), x=-2..2, y=-3..3, axes=boxed);
```



```
> f10:=(x,y)->x^2-x*y+y^2;
```

$$f10 := (x, y) \mapsto x^2 - xy + y^2$$

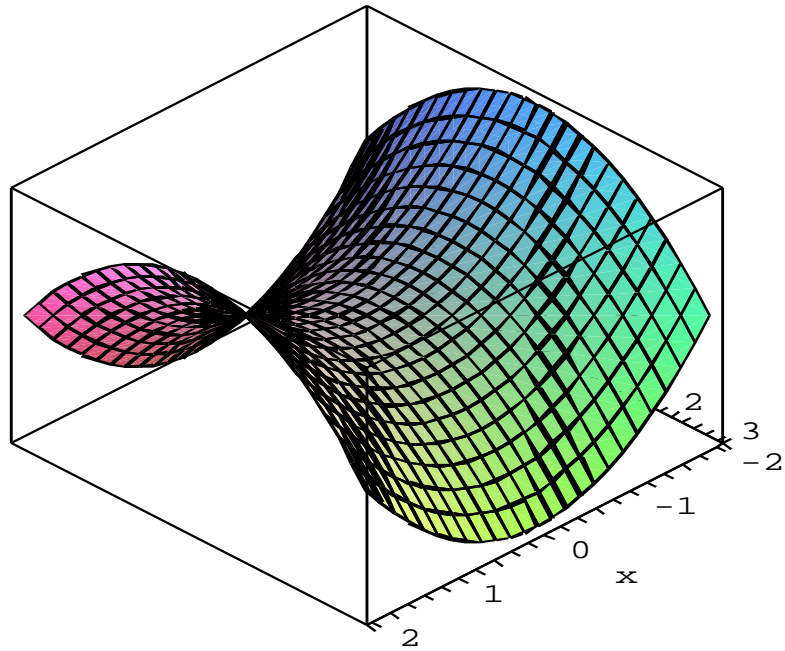
```
> plot3d(f10(x,y), x=-1..1, y=-1..1, axes=boxed);
```



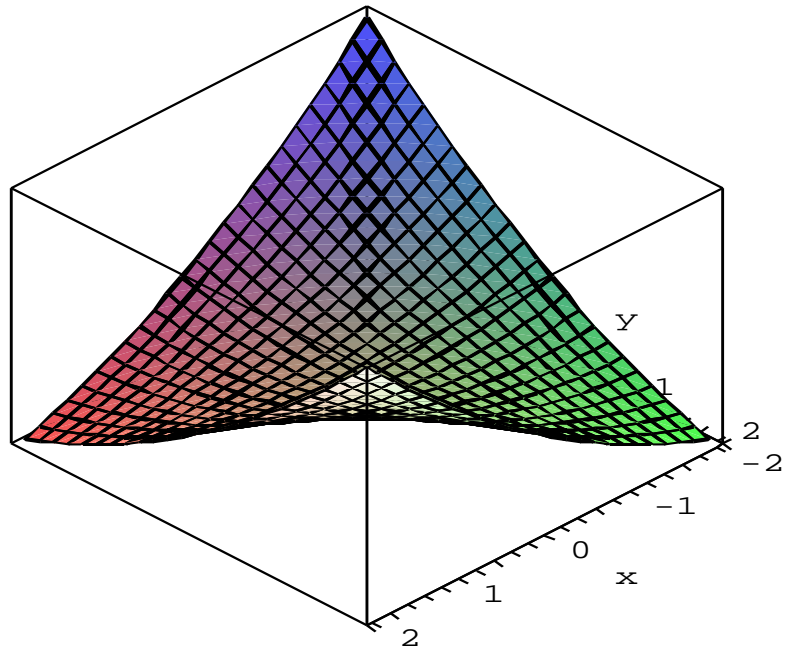
```
> f11:=(x,y)->x^2/4-y^2/9;
```

$$f11 := (x, y) \mapsto 1/4 x^2 - 1/9 y^2$$

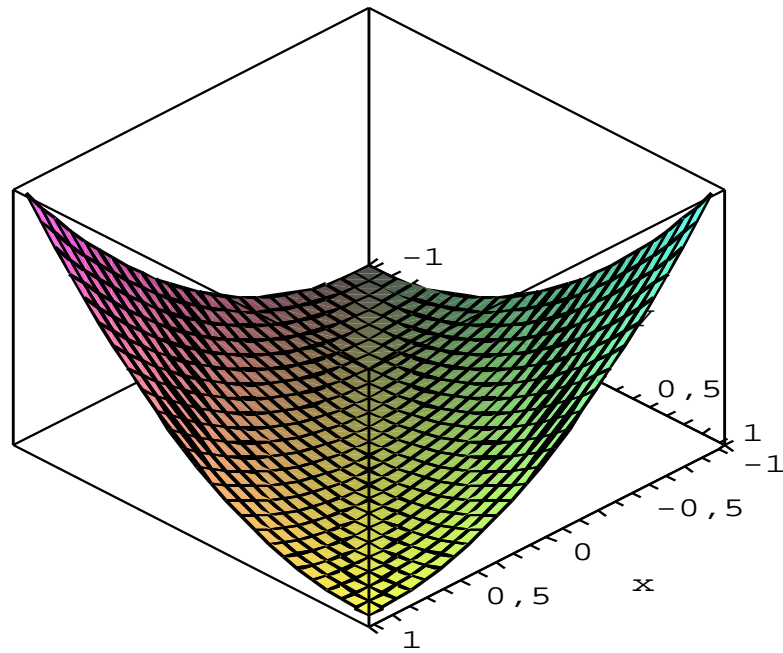
```
> plot3d(f11(x,y), x=-2..2, y=-3..3, axes=boxed);
```



```
> f12:=(x,y)->x^2+4*x*y+y^2;
      f12 := (x,y) ↦ x2 + 4xy + y2
> plot3d(f12(x,y), x=-2..2, y=-2..2, axes=boxed);
```



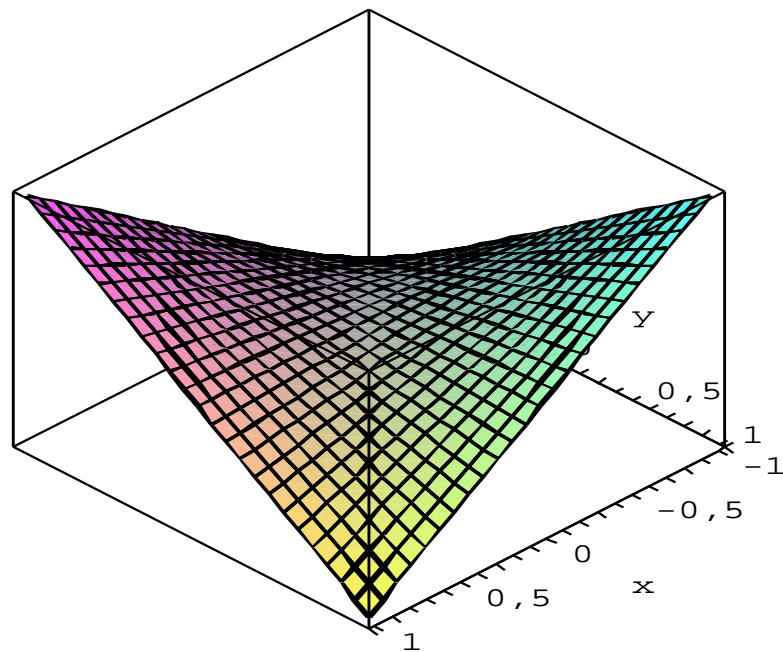
```
> f13:=(x,y)->x^2-2*x*y+y^2;
      f13 := (x,y) ↦ x2 - 2xy + y2
> plot3d(f13(x,y), x=-1..1, y=-1..1, axes=boxed);
```



```
> f14:=(x,y)->1-x*y;
```

$$f14 := (x, y) \mapsto 1 - xy$$

```
> plot3d(f14(x,y), x=-1..1, y=-1..1, axes=boxed);
```



## 2 Limity funkcí

```
> restart;
```

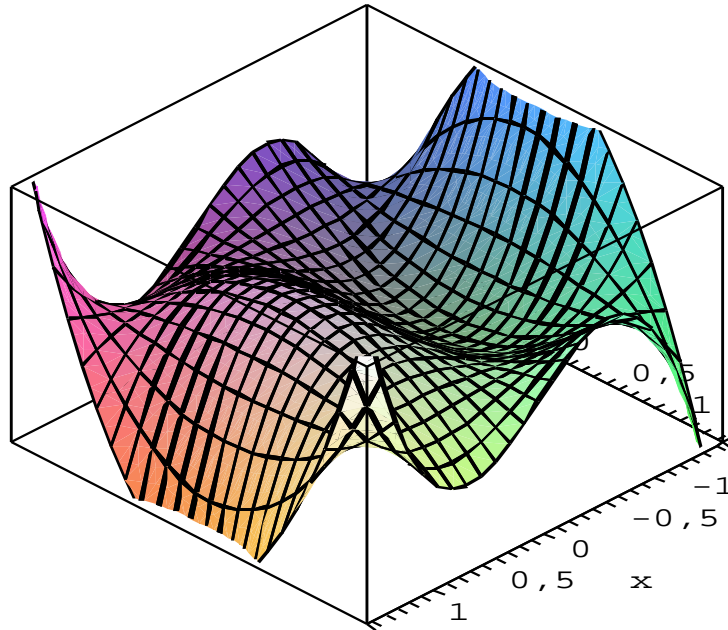
```
> with(plots):setoptions3d(axes=boxed);
```

Warning, the name `changecoords` has been redefined

```
> f1:=(x,y)->x-x^3-x*y^2+x^3*y^2;
```

$$f1 := (x, y) \mapsto x - x^3 - xy^2 + x^3y^2$$

```
> plot3d(f1(x,y), x=-1.4..1.4, y=-1.4..1.4, view=-1..1);
```

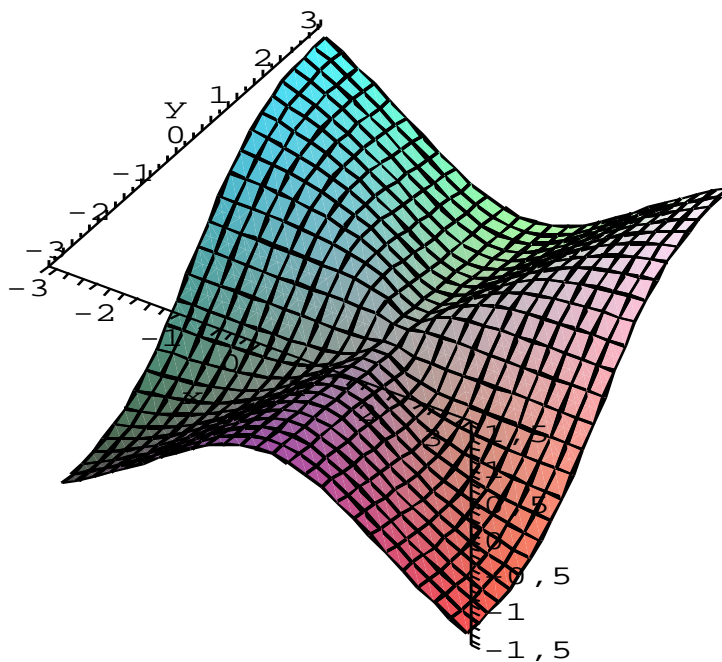


```
> f2:=(x,y)->(x^2*y)/(x^2+y^2);
```

$$f2 := (x, y) \mapsto \frac{x^2y}{x^2+y^2}$$

```
> plot3d(f2(x,y), x=-3..3, y=-3..3, orientation=[-57,38], axes=framed, grid=[26,26]);
```

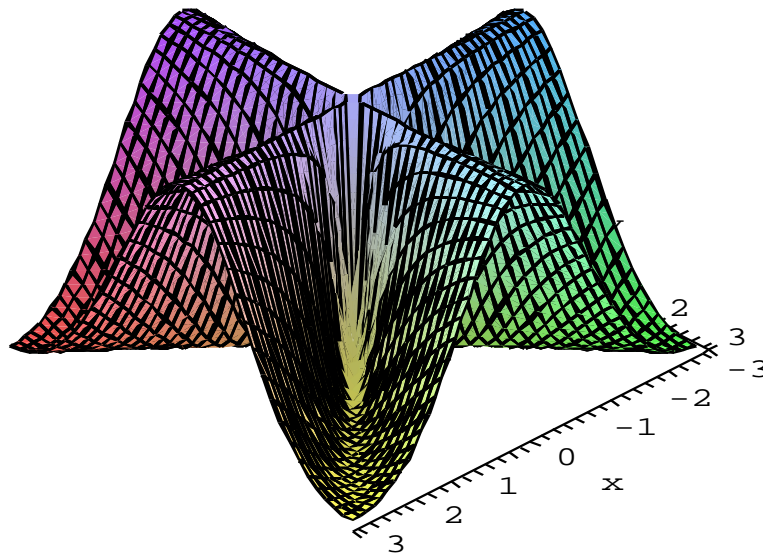




```
> f3:=(x,y)->((x^2-y^2)/(x^2+y^2))^2;
```

$$f3 := (x, y) \mapsto \frac{(x^2 - y^2)^2}{(x^2 + y^2)^2}$$

```
> plot3d(f3(x,y), x=-3..3, y=-3..3, grid=[51,39], axes=framed);
```



```
> f4:=(x,y)->(x*y)/(x^2+y^2);
```

$$f4 := (x, y) \mapsto \frac{xy}{x^2 + y^2}$$

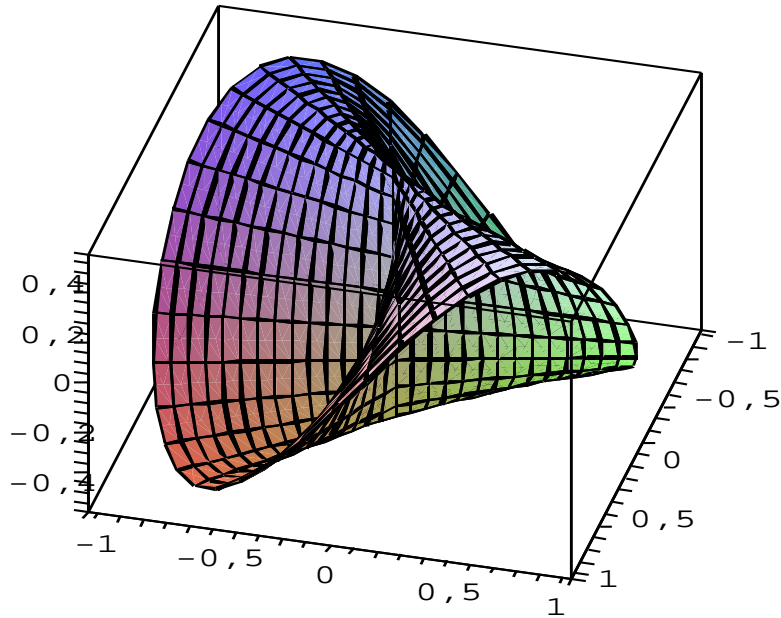
```
> f4 := proc (x, y) options operator, arrow; x*y/(x^2+y^2) end proc;
```

$$f4 := (x, y) \mapsto \frac{xy}{x^2 + y^2}$$

```

> z:=subs(x=r*cos(phi), y=r*sin(phi), f4(x,y)):
> plot3d([r*cos(phi), r*sin(phi), simplify(z)], r=0..1, phi=-Pi..Pi, grid=[15,45],
orientation=[15,45]);

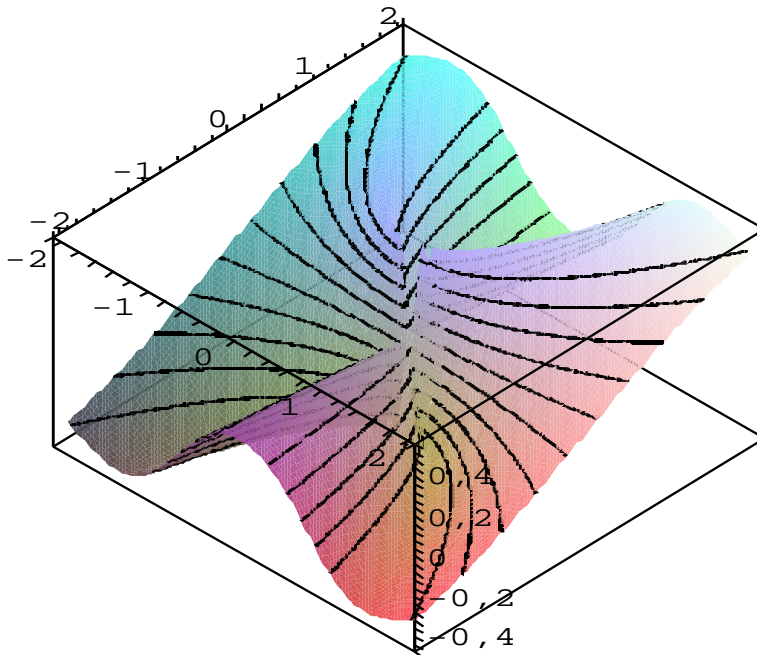
```



```

> f5:=proc(x,y) if x=0 and y=0 then 0 else x^2*y/(x^4+y^2) fi end;
f5 := proc(xy) if x = 0 and y = 0 then 0 else x^2 * y * (x^4 + y^2)^-1 end if; end proc;
> plot3d(f5, -2..2, -2..2, grid=[100,100], style=patchcontour, orientation=[-46,35],
contours=12);

```



```

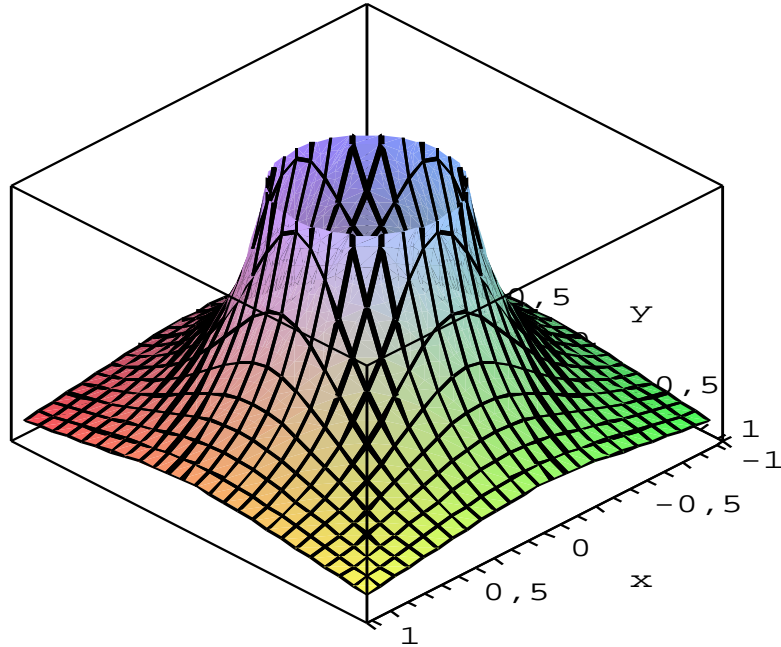
> f6:=(x,y)->1/(x^2+y^2);

```

```

      f6 := (x,y) ↦ (x2 + y2)-1
> plot3d(f6(x,y), x=-1..1, y=-1..1, view=0..6);

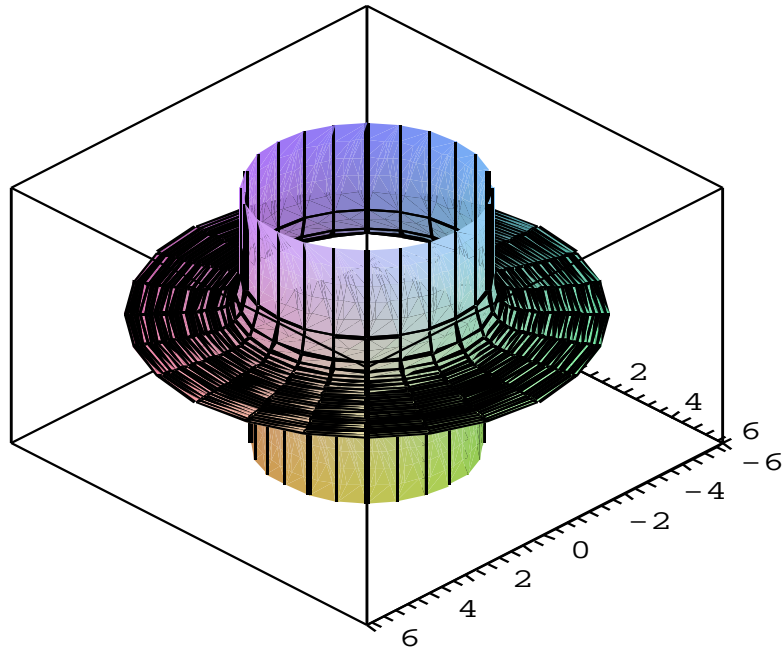
```



```

> f7:=(x,y)->2/(x2+y2-9);
      f7 := (x,y) ↦ 2 (x2 + y2 - 9)-1
> s1:=plot3d([u*cos(v), u*sin(v), subs(x=u*cos(v), y=u*sin(v), f7(x,y))], v=0..2*Pi,
u=0..2.999):
> s2:=plot3d([u*cos(v), u*sin(v), subs(x=u*cos(v), y=u*sin(v), f7(x,y))], v=0..2*Pi,
u=3.001..6):
> display3d(s1,s2, view=-8..8);

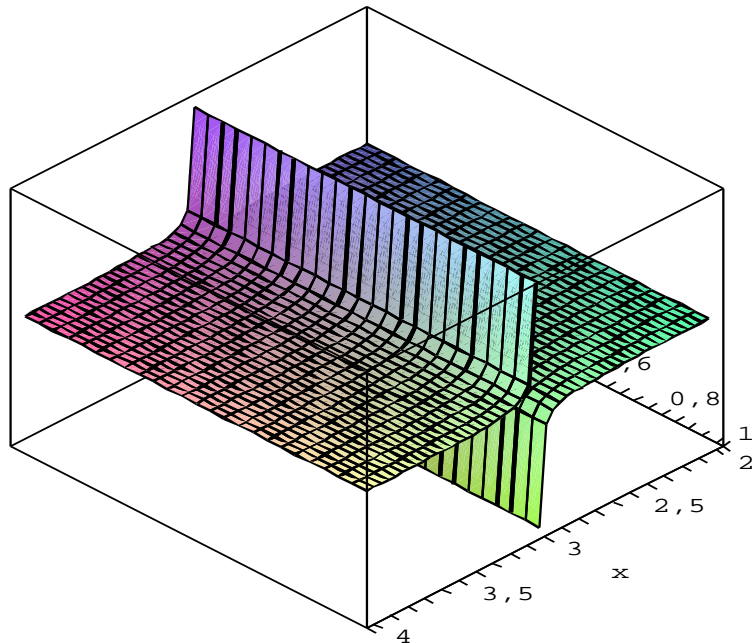
```



```

> f10:=(x,y)->2/(x^2-9);
                                 $f10 := (x, y) \mapsto 2(x^2 - 9)^{-1}$ 
> d1:=plot3d(f10(x,y), x=2..2.99, y=0..1):
> d2:=plot3d(f10(x,y), x=3.01..4, y=0..1):
> display3d(d1,d2);

```

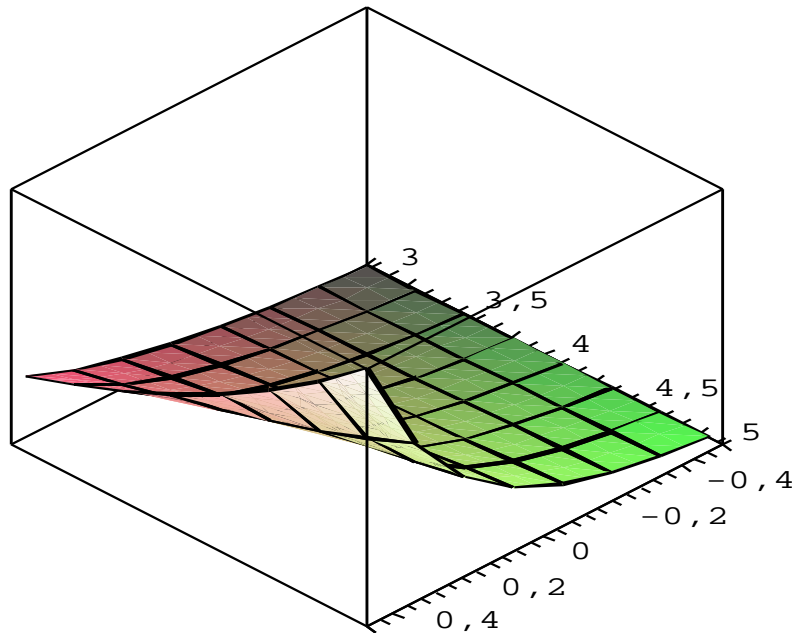


```

> f8:=(x,y)->(exp(x*y)-1)/x;
                                 $f8 := (x, y) \mapsto \frac{e^{xy} - 1}{x}$ 

```

```
> plot3d(f8,-.5..0.5, 3..5, grid=[8,8]);
```



```
> f9:=(x,y)->sin(x+y)/(Pi-x-y);
```

$$f_9 := (x, y) \mapsto \frac{\sin(x+y)}{\pi-x-y}$$

```
> plot3d(f9(x,y), x=0..Pi, y=0..Pi, grid=[30,60], style=patchcontour);
```

