

```
[ >
[ Pro danou funkci  $f(x)$  označme  $g(x)$  funkci, která v bodě  $x = a$  má hodnotu
směrnice tečny k  $f(x)$  v  $x = a$ . Tuto funkci  $g(x)$  značíme  $f'(x)$  a nazýváme
derivace  $f(x)$ .
```

```
[ >
[ > f := x -> x^2;
[  $f := x \rightarrow x^2$ 
[ > D(f);
[  $x \rightarrow 2x$ 
[ > D(f)(3);
[ 6
```

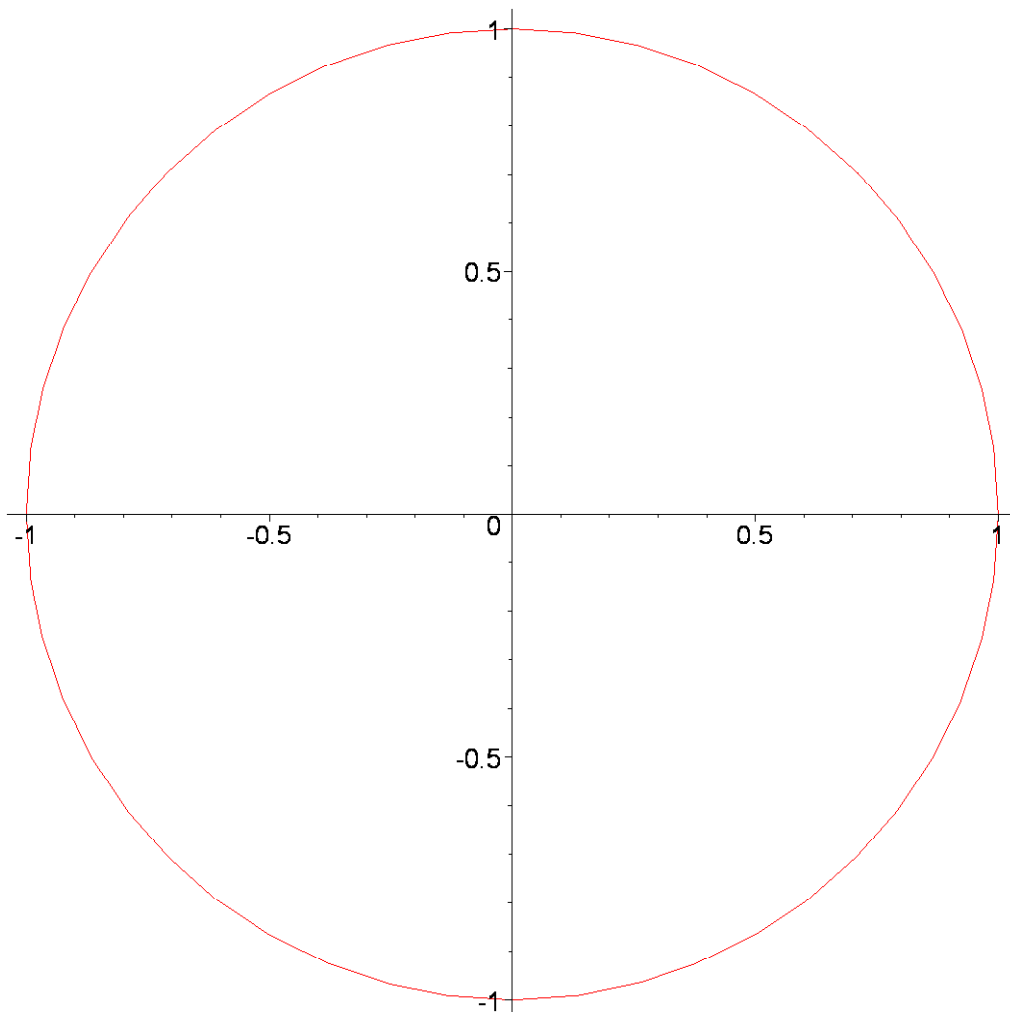
funkci derivujeme pomocí D, výraz pomocí diff :

```
[ > F := x^2;
[  $F := x^2$ 
[ > diff(F, x);
[ 2x
```

```
[ >
[ >
```

Rovnice  $x^2 + y^2 = 1$  definuje kružnici.

```
[ >
[ > with(plots):
[ > polarplot(1);
```



```
[ > plot([cos(x), sin(x), x=0..2*Pi]):
[ > implicitplot(x^2+y^2=1, x=-1..1, y=-1..1):
[ ... to jsou taky kruznice.
[ >
```

Tečna ke kružnici existuje s výjimkou  $x = 1$  a  $x = -1$  (nekonečná směrnice).

Rovnice  $x^2 + y^2 = 1$  definuje tzv. implicitní funkci  $y = y(x)$

Maple spočítá  $\frac{dy}{dx}$ , derivaci  $y$  vzhledem k  $x$ .

```
[ > F := (x,y)-> x^2 + y^2 - 1;
[                                     F := (x, y) → x2 + y2 - 1
[ >
[ >
[ > r:=1:
[ > p:=sqrt(2)/2: q:=sqrt(2)/2:
[ > n:=30000:
[ >
```

Zobrazime r-okoli bodu (p,q), v nem je cast hledane krivky a tecna se smernici k.  
n je kvalita implitniho grafu nize

Pro zvolenou rovnici a parametry nasleduje vypocet tecny a grafu:

Overime podminky pro pouziti metody:

```
> subs(x=p,y=q,diff(F(x,y),y));
```

$$\sqrt{2}$$

to musi byt nenulove ... pak ta metoda funguje

```
> if (subs(x=p,y=q,diff(F(x,y),y)) = 0) then print(NEFUNGUJE) else  
print (FUNGUJE) end if;
```

*FUNGUJE*

```
>
```

```
> rovnice := F(x,y) = 0;
```

$$\text{rovnice} := x^2 + y^2 - 1 = 0$$

```
> dy/dx = implicitdiff(rovnice, y, x);
```

$$\frac{dy}{dx} = -\frac{x}{y}$$

```
> k:=subs(x=p, y=p, implicitdiff(rovnice, y, x));
```

$$k := -1$$

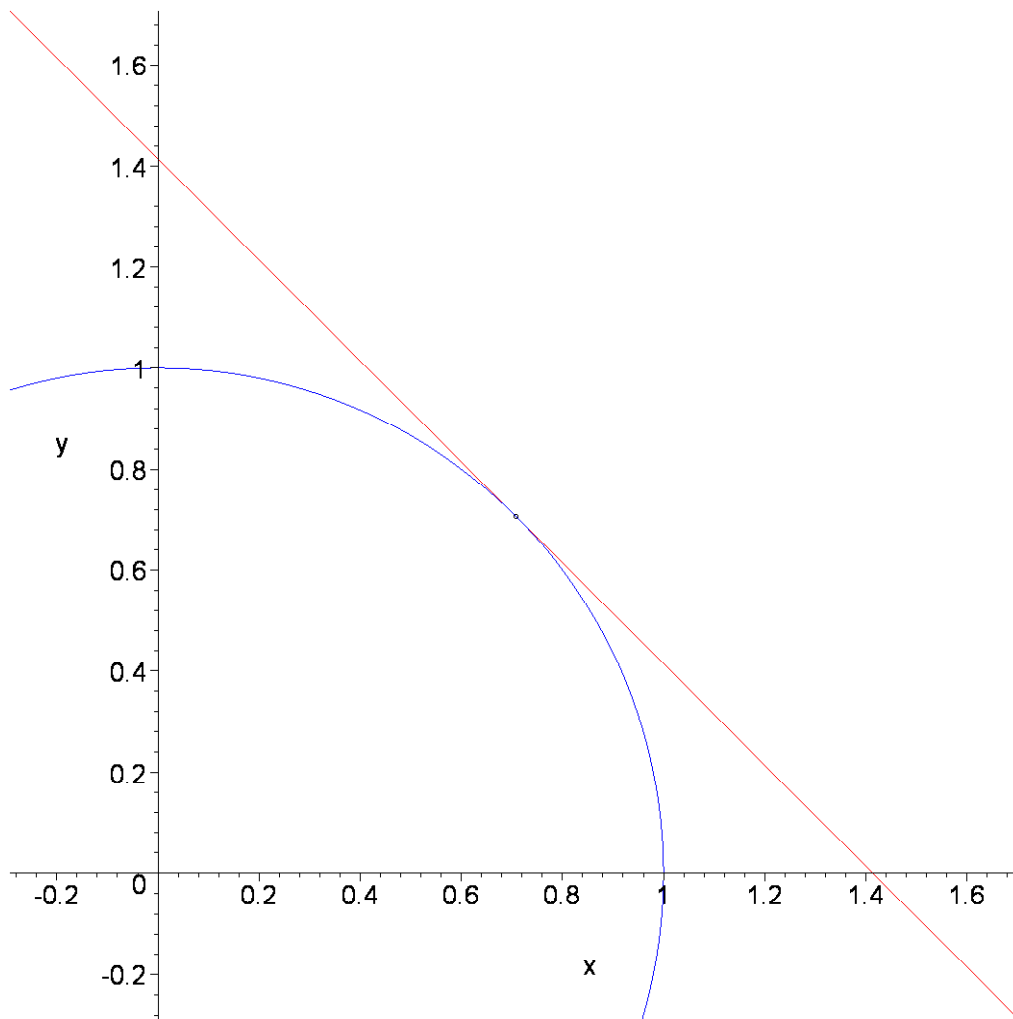
```
> with(plots):
```

```
> plot1:=implicitplot(rovnice, x=(p-r)..(p+r), y=(q-r)..(q+r),  
color=blue,numpoints=n):
```

```
> plot2:=plot(k*(x-p) + q, x=(p-r)..(p+r),  
y=(q-r)..(q+r),color=red):
```

```
> plot3:=plot([[p,q]], style=POINT, symbol=CIRCLE, color=black):
```

```
> display([plot1, plot2,plot3], scaling=constrained);
```



[ funguji i tyto volby:

[ >  $F := (x,y) \rightarrow y^2 - x:$

[ >  $r:=1:$

[ >  $p:=1: q:=1:$

[ >

[ >  $F := (x,y) \rightarrow y - x^2:$

[ >  $r:=1:$

[ >  $p:=1: q:=1:$

[ >

[ tohle je Descartev list:

[ >  $F := (x,y) \rightarrow x^3 + y^3 - 2*x*y:$

[ >  $r:=3:$

[ >  $p:=1: q:=1:$

[ >

[ >

[ tohle selze (proc?):

[ >  $F := (x,y) \rightarrow x^3 + y^3 - 2*x*y:$

[ >  $r:=1:$

[ >  $p:=0: q:=0:$

[ >

[ >

[

[ >