

**mplDi0002R.mw**  
**MatOhj2013 viikko2 teht. 9**

**Viikko 2, teht. 9**

```
> restart:
```

```
> with(plots) : with(plottools) : with(LinearAlgebra) :
```

```
> setoptions3d(axes = BOXED);
```

```
> nuoli:=(alku,loppu,vari)->arrow(alku,loppu,0.01,0.05,0.02,  
color=vari):
```

```
> korkeuskayra:=k->implicitplot(abs(x*y)=k,x=-2..2,y=-2..2);
```

```
korkeuskayra := k → plots:-implicitplot(|x y| = k, x = -2 ..2, y = -2 ..2) (1.1)
```

```
> korkeusk3kuva:=display(seq(korkeuskayra(k),k=1..3)):
```

```
> fx:=diff(abs(x*y),x); fy:=diff(abs(x*y),y);
```

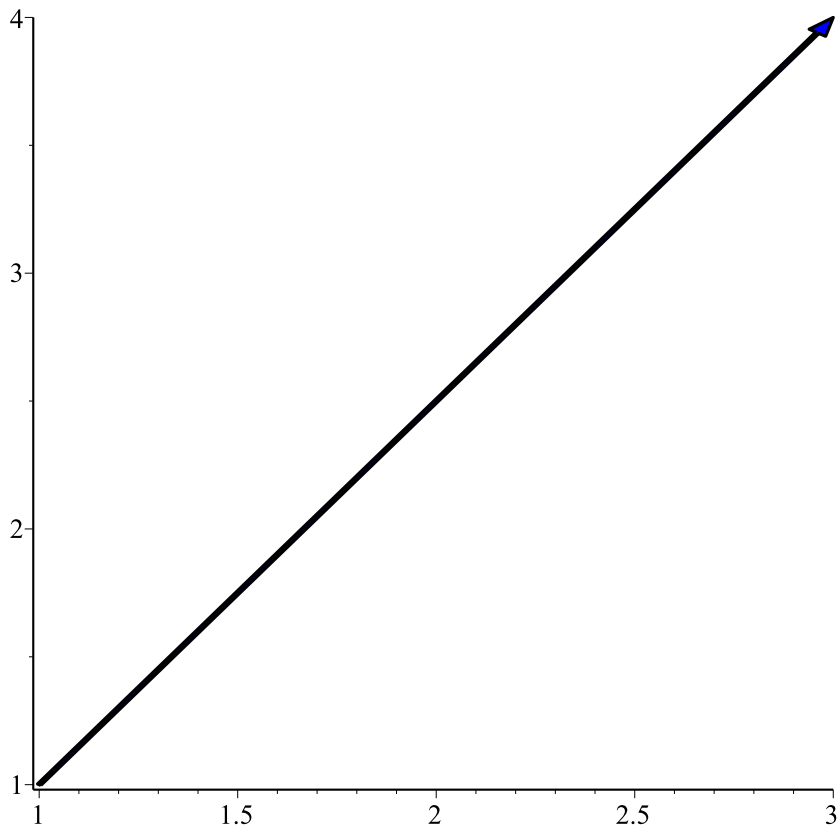
```
fx := abs(1, x y) y
```

```
fy := abs(1, x y) x (1.2)
```

```
> subs(x=0,fx)
```

```
abs(1, 0) y (1.3)
```

```
>
```



>

*v*

(1.4)

>

>

```
> fx0:=subs(x=x0,y=y0,fx); fy0:=subs(x=x0,y=y0,fy);
```

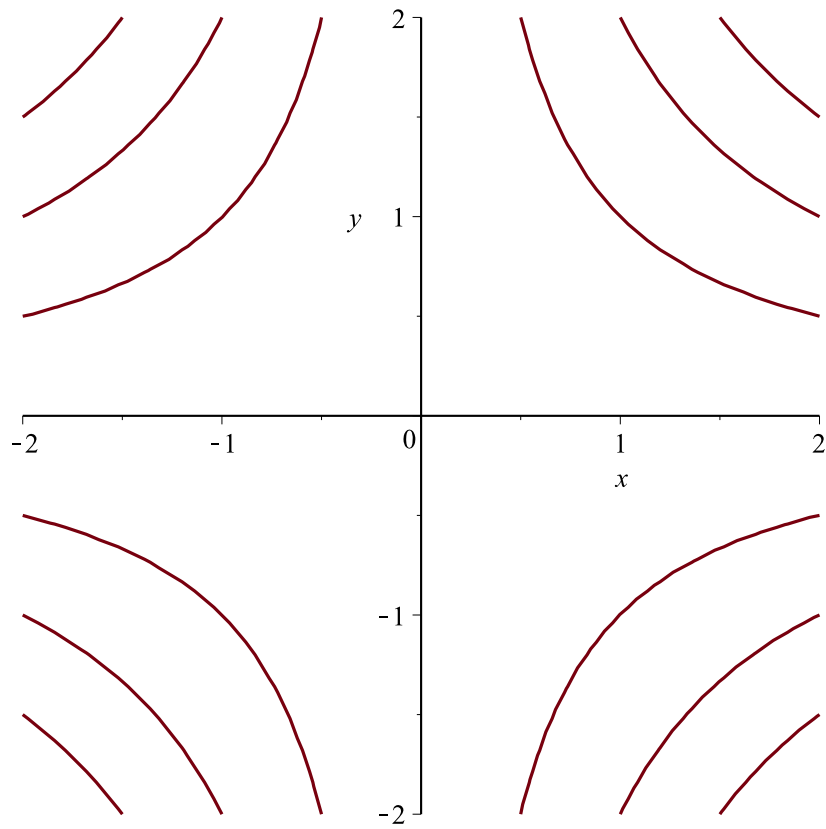
```
      fx0:=abs(1,x0)y0
```

```
      fy0:=abs(1,x0)x0
```

(1.5)

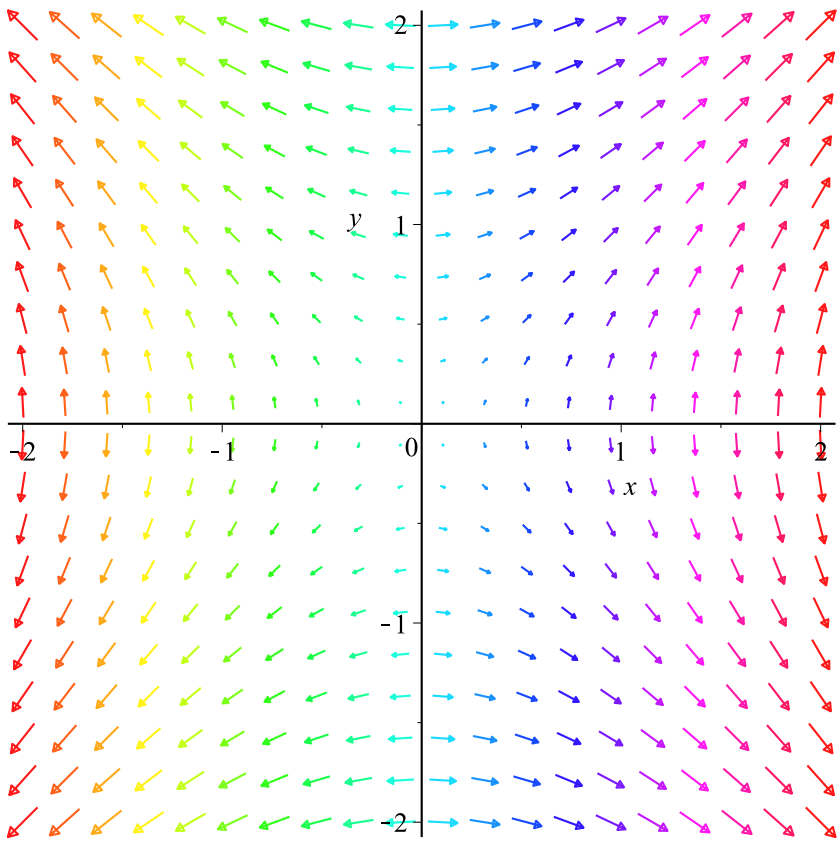
```
> nuolikuva:=display(nuoli([x0,y0],[x0+fx0,y0+fy0],blue));
```

```
> display(korkeusk3kuva,nuolikuva,scaling=constrained);
```



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

```
> fieldplot(grad(abs(x*y),[x,y]),x=-2..2,y=-2..2,arrows=slim,  
color=x);
```



```
> display(%,korkeusk3kuva,nuolikuva,scaling=constrained);
```

