```
> restart;
> nullst:=solve(x^2+p*x+q=0,x);
```

$$nullst := -\frac{1}{2}p + \frac{1}{2}\sqrt{p^2 - 4\,q},\ -\frac{1}{2}p - \frac{1}{2}\sqrt{p^2 - 4\,q}$$

```
> nullst[2];
```

$$-\frac{1}{2}p - \frac{1}{2}\sqrt{p^2 - 4\,q}$$

```
> p:=x^3-4*x+1;
```

$$p := x^3 - 4\,x + 1$$

```
> np:=solve(p=0,x);
```

$$np := \frac{1}{6}(-108 + 12\,I\sqrt{687}\,)^{(1/3)} + 8\,\frac{1}{(-108 + 12\,I\sqrt{687}\,)^{(1/3)}},$$

$$-\frac{1}{12}(-108 + 12\,I\sqrt{687}\,)^{(1/3)} - 4\,\frac{1}{(-108 + 12\,I\sqrt{687}\,)^{(1/3)}} + \frac{1}{2}$$

$$I\sqrt{3}\left(\frac{1}{6}(-108 + 12\,I\sqrt{687}\,)^{(1/3)} - 8\,\frac{1}{(-108 + 12\,I\sqrt{687}\,)^{(1/3)}}\right),$$

$$-\frac{1}{12}(-108 + 12\,I\sqrt{687}\,)^{(1/3)} - 4\,\frac{1}{(-108 + 12\,I\sqrt{687}\,)^{(1/3)}} - \frac{1}{2}$$

$$I\sqrt{3}\left(\frac{1}{6}(-108 + 12\,I\sqrt{687}\,)^{(1/3)} - 8\,\frac{1}{(-108 + 12\,I\sqrt{687}\,)^{(1/3)}}\right)$$

```
> np[1];
```

$$\frac{1}{6}(-108+12\,I\sqrt{687})^{(1/3)}+8\,\frac{1}{(-108+12\,I\sqrt{687})^{(1/3)}}$$

```
> evalf(%);
```

$$1.860805853+.2\;10^{-9}\,I$$

```
> np[2];
```

$$-\frac{1}{12}(-108+12\,I\sqrt{687})^{(1/3)}-4\,\frac{1}{(-108+12\,I\sqrt{687})^{(1/3)}}+\frac{1}{2}\,I\sqrt{3}\left(\frac{1}{6}(-108+12\,I\sqrt{687})^{(1/3)}-8\,\frac{1}{(-108+12\,I\sqrt{687})^{(1/3)}}\right)$$

```
> evalf(%);
```

$$-2.114907542+.3\;10^{-9}\,I$$

```
> evalc(np[2]);
```

$$-\frac{1}{12}\,192^{(1/3)}\,3^{(1/6)}\cos\left(-\frac{1}{3}\arctan\left(\frac{1}{9}\sqrt{687}\right)+\frac{1}{3}\pi\right)$$
$$-\frac{1}{144}\,192^{(2/3)}\,3^{(5/6)}\cos\left(-\frac{1}{3}\arctan\left(\frac{1}{9}\sqrt{687}\right)+\frac{1}{3}\pi\right)-\frac{1}{2}\sqrt{3}\Bigg($$
$$\frac{1}{6}\,192^{(1/3)}\,3^{(1/6)}\sin\left(-\frac{1}{3}\arctan\left(\frac{1}{9}\sqrt{687}\right)+\frac{1}{3}\pi\right)$$
$$+\frac{1}{72}\,192^{(2/3)}\,3^{(5/6)}\sin\left(-\frac{1}{3}\arctan\left(\frac{1}{9}\sqrt{687}\right)+\frac{1}{3}\pi\right)\Bigg)+I\Bigg($$
$$-\frac{1}{12}\,192^{(1/3)}\,3^{(1/6)}\sin\left(-\frac{1}{3}\arctan\left(\frac{1}{9}\sqrt{687}\right)+\frac{1}{3}\pi\right)$$

$$+\frac{1}{144}\,192^{(2/3)}\,3^{(5/6)}\sin\left(-\frac{1}{3}\arctan\left(\frac{1}{9}\sqrt{687}\right)+\frac{1}{3}\pi\right)+\frac{1}{2}\sqrt{3}\,\Bigg($$

$$\frac{1}{6}\,192^{(1/3)}\,3^{(1/6)}\cos\left(-\frac{1}{3}\arctan\left(\frac{1}{9}\sqrt{687}\right)+\frac{1}{3}\pi\right)$$

$$-\frac{1}{72}\,192^{(2/3)}\,3^{(5/6)}\cos\left(-\frac{1}{3}\arctan\left(\frac{1}{9}\sqrt{687}\right)+\frac{1}{3}\pi\right)\Bigg)\Bigg)$$

```
> simplify(%);
```

$$-\frac{2}{3}\sqrt{3}\cos\left(-\frac{1}{3}\arctan\left(\frac{1}{9}\sqrt{3}\,\sqrt{229}\right)+\frac{1}{3}\pi\right)$$

$$-2\sin\left(-\frac{1}{3}\arctan\left(\frac{1}{9}\sqrt{3}\,\sqrt{229}\right)+\frac{1}{3}\pi\right)$$

```
> evalf(%);
```

$$-2.114907542$$

```
> q:=x^4-x-1;
```

$$q := x^4 - x - 1$$

```
> solve(q=0,x);
```

$$\mathrm{RootOf}(\_Z^4 - \_Z - 1, \mathit{index} = 1),$$

$$\mathrm{RootOf}(\_Z^4 - \_Z - 1, \mathit{index} = 2),$$

$$\mathrm{RootOf}(\_Z^4 - \_Z - 1, \mathit{index} = 3),$$

$$\mathrm{RootOf}(\_Z^4 - \_Z - 1, \mathit{index} = 4)$$

```
> allvalues(%[1]);
```

$$\frac{1}{12}\sqrt{6}\sqrt{\frac{(108+12\sqrt{849})^{(2/3)}-48}{(108+12\sqrt{849})^{1/3}}}+\frac{1}{12}\,\mathrm{sqrt}\Bigg(\Bigg(-6\sqrt{\frac{(108+12\sqrt{849})^{(2/3)}-48}{(108+12\sqrt{849})^{1/3}}}\,(108+12\sqrt{849})^{(2/3)}+288\sqrt{\frac{(108+12\sqrt{849})^{(2/3)}-48}{(108+12\sqrt{849})^{1/3}}}+72\sqrt{6}\,(108+12\sqrt{849})^{(1/3)}\Bigg)\Bigg/\Bigg((108+12\sqrt{849})^{1/3}\sqrt{\frac{(108+12\sqrt{849})^{(2/3)}-48}{(108+12\sqrt{849})^{1/3}}}\Bigg)\Bigg)$$

```
> r:=x^5-3*x-1;
```

$$r := x^5 - 3\,x - 1$$

```
> solve(r=0,x);
```

$$\mathrm{RootOf}(\_Z^5 - 3\,\_Z - 1, \mathit{index} = 1),$$
$$\mathrm{RootOf}(\_Z^5 - 3\,\_Z - 1, \mathit{index} = 2),$$
$$\mathrm{RootOf}(\_Z^5 - 3\,\_Z - 1, \mathit{index} = 3),$$
$$\mathrm{RootOf}(\_Z^5 - 3\,\_Z - 1, \mathit{index} = 4),$$
$$\mathrm{RootOf}(\_Z^5 - 3\,\_Z - 1, \mathit{index} = 5)$$

```
> allvalues(%[1]);
```

$$\text{RootOf}(\_Z^5 - 3\ \_Z - 1, index = 1)$$

```
> fsolve(r=0,x);
```

-1.214648043, -.3347341419, 1.388791984

```
> fsolve(r=0,x,complex);
```

```
> fsolve(r=0,x,-1..2);
```

-.3347341419, 1.388791984

```
> solve(sin(x)=x,x);
```

0

```
> solve(sin(x)=3*cos(x),x);
```

arctan(3)

```
> solve(tan(x)=x,x);
```

$$\text{RootOf}(-\tan(\_Z) + \_Z)$$

```
> x1:=fsolve(tan(x)=x,x,avoid={x=0});
```

$x1$:= -4.493409458

```
> fsolve(tan(x)=x,x,avoid={x=0,x=x1});
```

4.493409458

```
> fsolve(tan(x)=x,x,1..6);
>
```

4.493409458

```
> gl1:=x+y=3;
```

$$gl1 := x + y = 3$$

```
> gl2:=x+c*y=4;
```

$$gl2 := x + c\ y = 4$$

```
> solve({gl1,gl2},{x,y});
```

$$\{y = \frac{1}{-1+c}, x = \frac{-4+3\,c}{-1+c}\}$$

```
> gl3:=subs(c=1,gl2);
```

$$gl3 := x + y = 4$$

```
> solve({gl1,gl3},{x,y});
> solve(x*x<=1,x);
```

$$\text{RealRange}(-1, 1)$$

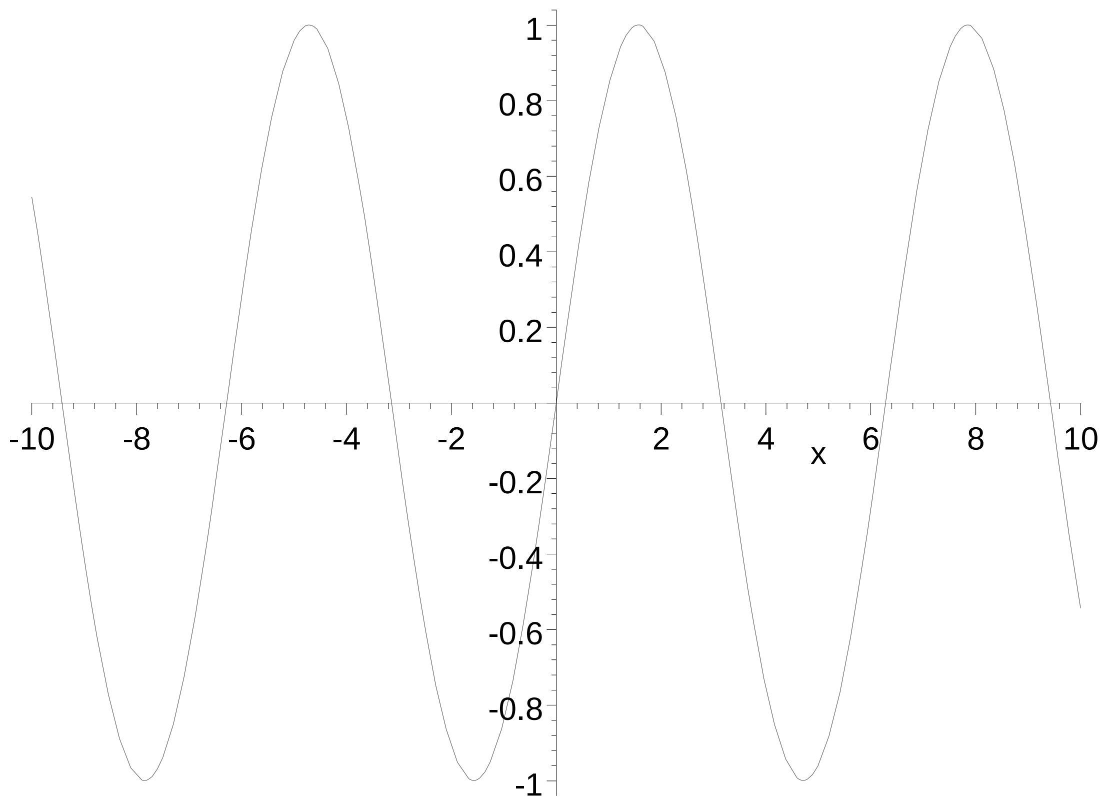
```
> solve(a*x<1,{x});
```

$$\{x < \frac{1}{a\sim}\}$$

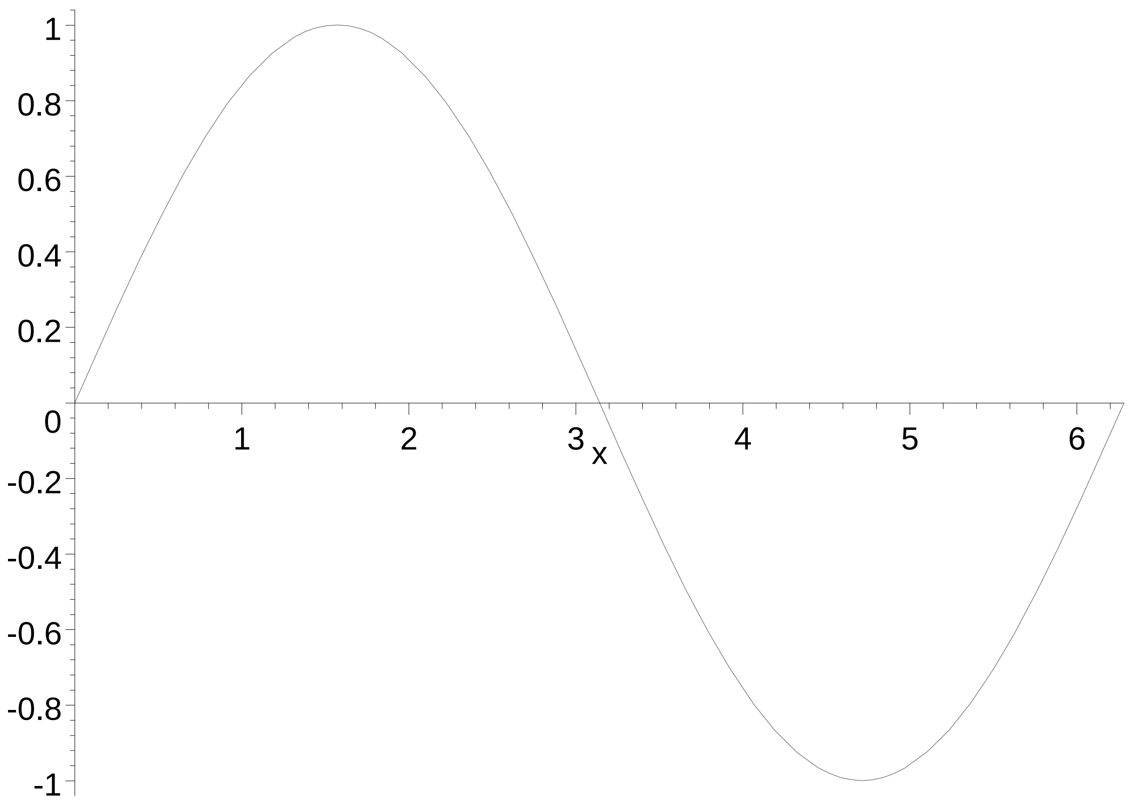
```
> assume(a>0);
> signum(a);
```

$$1$$

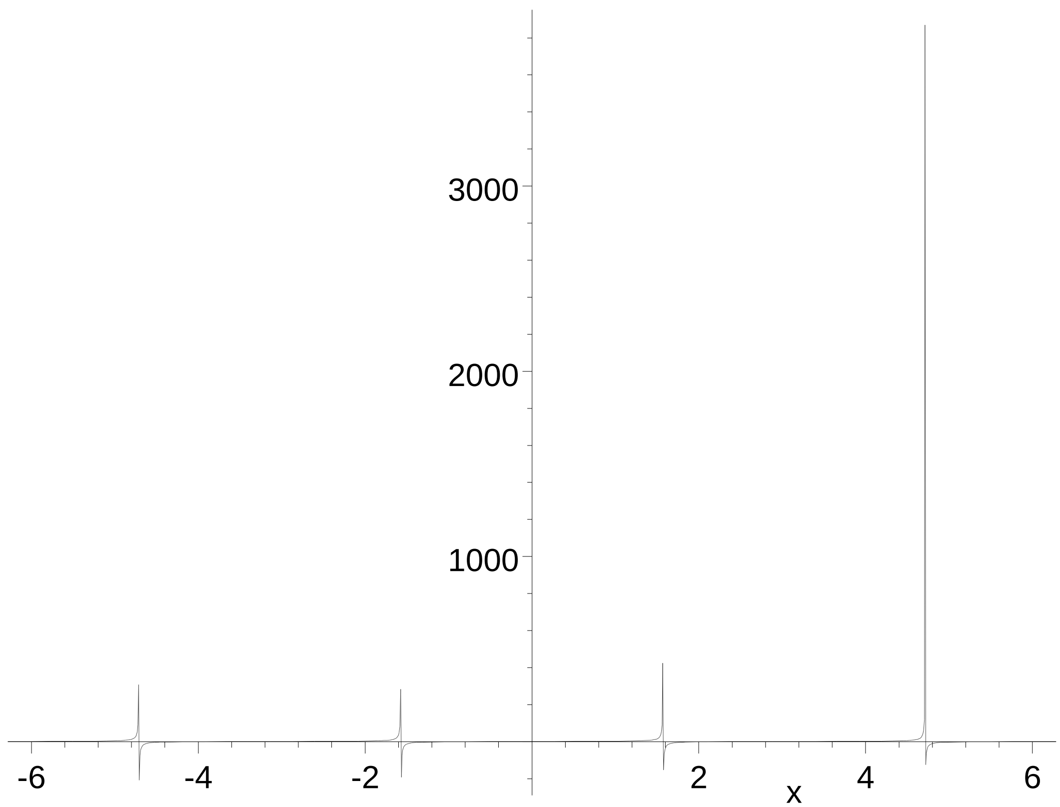
```
> plot(sin(x),x);
```




```
> plot(sin(x),x=0..2*Pi);
```

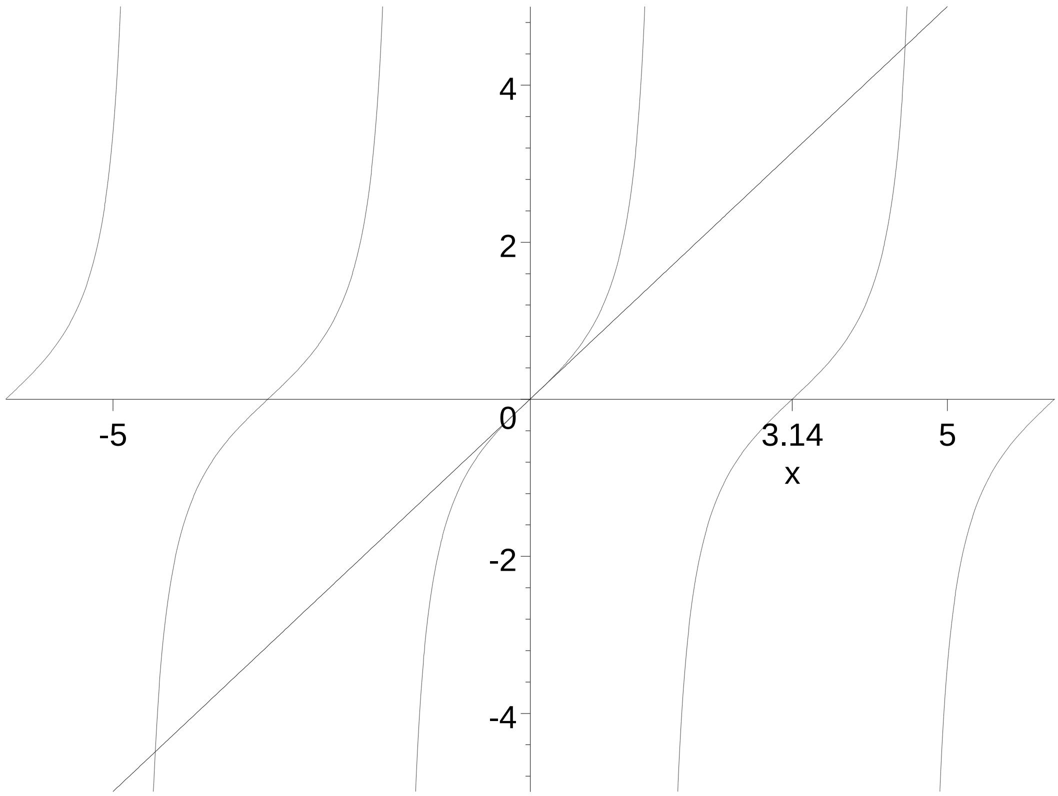



```
> plot(tan(x),x=-2*Pi..2*Pi);
```

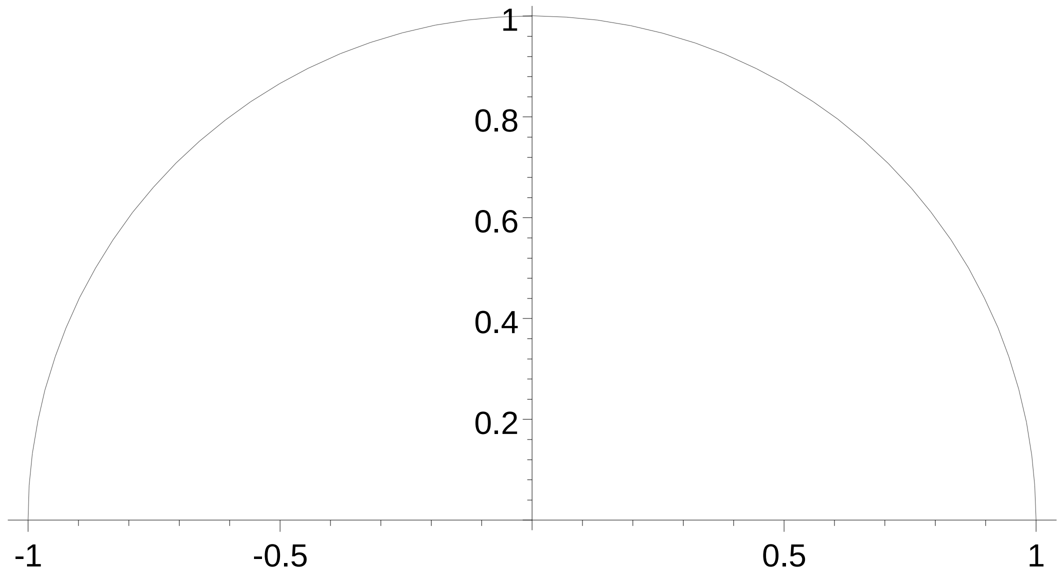



```
> plot({tan(x),x},x=-2*Pi..2*Pi,-5..5,discont
  =true,color=[blue,red],title=`Fixpunkte des
  Tangens`,xtickmarks=[-5,3.14,5],numpoints=5
  00);
```

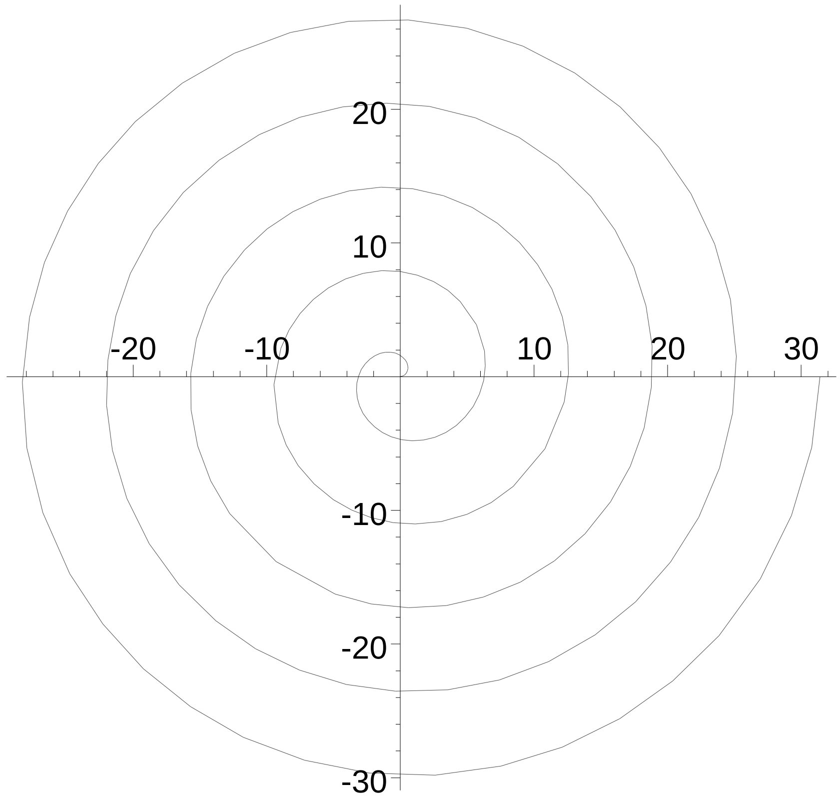
Fixpunkte des Tangens




```
> plot([cos(t),sin(t),t=0..Pi],scaling=constr
  ained);
```



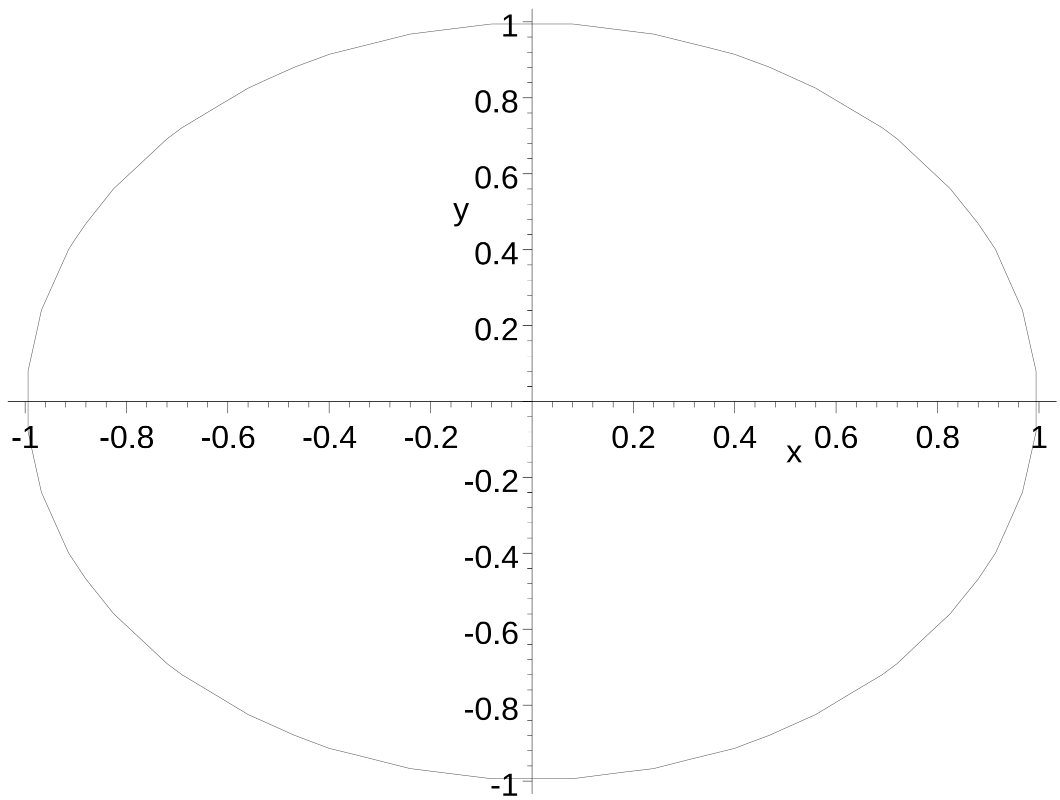

```
> plot([t*cos(t),t*sin(t),t=0..10*Pi],scaling
  =constrained);
```



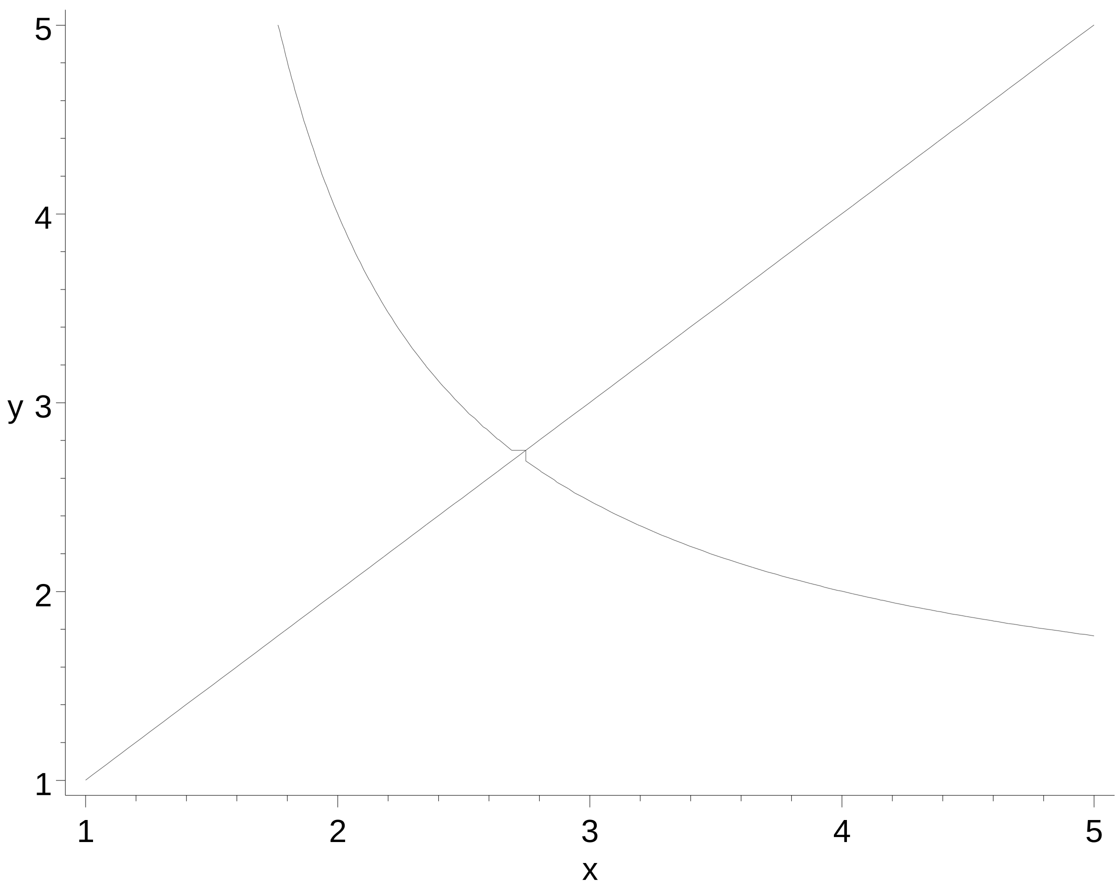

```
> with(plots);
```

[*animate*, *animate3d*, *animatecurve*, *changecoords*, *complexplot*, *complexplot3d*, *conformal*, *contourplot*, *contourplot3d*, *coordplot*, *coordplot3d*, *cylinderplot*, *densityplot*, *display*, *display3d*, *fieldplot*, *fieldplot3d*, *gradplot*, *gradplot3d*, *implicitplot*, *implicitplot3d*, *inequal*, *listcontplot*, *listcontplot3d*, *listdensityplot*, *listplot*, *listplot3d*, *loglogplot*, *logplot*, *matrixplot*, *odeplot*, *pareto*, *pointplot*, *pointplot3d*, *polarplot*, *polygonplot*, *polygonplot3d*, *polyhedra_supported*, *polyhedraplot*, *replot*, *rootlocus*, *semilogplot*, *setoptions*, *setoptions3d*, *spacecurve*, *sparsematrixplot*, *sphereplot*, *surfdata*, *textplot*, *textplot3d*, *tubeplot*]

```
> implicitplot(x^2+y^2=1,x=-2..2,y=-2..2);
```




```
> implicitplot(x^y=y^x,x=1..5,y=1..5,numpoints=5000);
```


5
4
y 3
2
1
1
2
3
4
5
x

>

>

>