```
> #EX1:
> evalf(1/2);
```

$$0.5000000000 \quad (1)$$

```
> evalf(Pi);
```

$$3.141592654 \quad (2)$$

```
> sqrt(3);
```

$$\sqrt{3} \quad (3)$$

```
> evalf(sqrt(3));
```

$$1.732050808 \quad (4)$$

```
> digits := 10;
```

$$digits := 10 \quad (5)$$

```
> #EX2:
> restart;
> a := 2;
```

$$a := 2 \quad (6)$$

```
>
> restart;
> a := (x^2 + 2·x - 1)^2;
```

$$a := (x^2 + 2x - 1)^2 \quad (7)$$

```
> a := (x^2 + 2·x - 1)^3·(x^2 - 1);
```

$$a := (x^2 + 2x - 1)^3 (x^2 - 1) \quad (8)$$

```
> a
> expand(a);
```

$$x^8 + 6x^7 + 8x^6 - 10x^5 - 18x^4 + 10x^3 + 8x^2 - 6x + 1 \quad (9)$$

```
> f := x→(x^2 + 2·x - 1)^3·(x^2 - 2);
```

$$f := x \mapsto (x^2 + 2 \cdot x - 1)^3 \cdot (x^2 - 2) \quad (10)$$

```
> f(x);
```

$$(x^2 + 2x - 1)^3 (x^2 - 2) \quad (11)$$

```
> expand(f(x));
```

$$x^8 + 6x^7 + 7x^6 - 16x^5 - 27x^4 + 14x^3 + 17x^2 - 12x + 2 \quad (12)$$

```
> f := (x, n)→(x + n)^5;
```

$$f := (x, n) \mapsto (x + n)^5 \quad (13)$$

```
> f(x, n);
```

$$(x + n)^5 \quad (14)$$

```
>
> #EX3:
> restart;
```

```
> factor(x^8 - 1);
```

$$(x-1)\,(x+1)\,(x^2+1)\,(x^4+1) \tag{15}$$

```
>
>
> #----------------------------------------EX4:
> g := (2·x^2)/(x^3 - 1) + (3·x)/(x^2 - 1);
```

$$g := \frac{2x^2}{x^3-1} + \frac{3x}{x^2-1} \tag{16}$$

```
factor(g(x));
```

$$\frac{(5\,x(x)^2 + 5\,x(x) + 3)\,x(x)}{(x(x)-1)\,(x(x)+1)\,(x(x)^2 + x(x) + 1)} \tag{17}$$

```
> # ----------------------------------------EX5:

> simplify(sin(x)^2 + cos(x)^2)
```

$$1 \tag{18}$$

```
> #----------------------------------------Ex6:
> simplify(subs(x = 1, exp(x) + ln(x)));
```

$$\mathrm{e} \tag{19}$$

```
> eval(exp(x) + ln(x), x = 1);
```

$$\mathrm{e} \tag{20}$$

```
> subs(x = 1, exp(x) + ln(x))
```

$$\mathrm{e} + \ln(1) \tag{21}$$

```
> #----------------------------------------Ex7:
> solve(x^2 - 4*x + 3 = 0, x);
```

$$3,\ 1 \tag{22}$$

```
> solve(x^2·y - 2 y - x = 0, y);
```

$$\frac{x}{x^2-2} \tag{23}$$

```
> solve(x - cos(x) = 0, x);
```

$$RootOf(\_Z - \cos(\_Z)) \tag{24}$$

```
> fsolve(x - cos(x) = 0, x);
```

$$0.7390851332 \tag{25}$$

```
>
> fsolve(x^5 - 3*x^3 - 1 = 0, x);
```

$$-1.668777593,\ -0.7418139305,\ 1.782308780 \tag{26}$$

```
> ec1 := 4*x + 3*y = 10;
```

$$ec1 := 4x + 3y = 10 \tag{27}$$

```
> ec2 := 3*x - y = 1;
```

$$ec2 := 3x - y = 1 \tag{28}$$

```
> syst := ec1, ec2;
```

$$syst := 4x + 3y = 10,\ 3x - y = 1 \tag{29}$$

```
> solve({syst}, {x, y});
```

$$\{x = 1,\ y = 2\} \tag{30}$$

```
> #----------------------------------------Ex8:
> f := x->exp(x) - sin(x)
```

$$f := x \mapsto e^{x} - \sin(x) \tag{31}$$

```
> f(x);
```

$$e^{x} - \sin(x) \tag{32}$$

```
> f(0); f(-1); D(f)(0); D(f)(1);
```

$$1$$
$$e^{-1} + \sin(1)$$
$$0$$
$$e - \cos(1) \tag{33}$$

```
> diff(f(x), x$5)
```

$$\frac{d^5}{dx^5} f(x) \tag{34}$$

```
> int(f(x), x = -1..1)
```

$$\int_{-1}^{1} f(x)\,dx \tag{35}$$

```
> #----------------------------------------Ex9:
```

```
> g := exp(x) - sin(x)
```

$$g := e^{x} - \sin(x) \quad (36)$$

```
> eval(g, x = 0);
```

$$1 \quad (37)$$

```
> b := diff(g, x);
```

$$b := e^{x} - \cos(x) \quad (38)$$

```
> subs(x = 0, g);
```

$$e^{0} - \sin(0) \quad (39)$$

```
> int(g, x = -1 ..1)
```

$$-e^{-1} + e \quad (40)$$

```
> f := diff(g, x$2);
```

$$f := e^{x} + \sin(x) \quad (41)$$

```
> eval(f, x = 0)
```

$$f \quad (42)$$

```
> # ----------------------------------EX10:
```

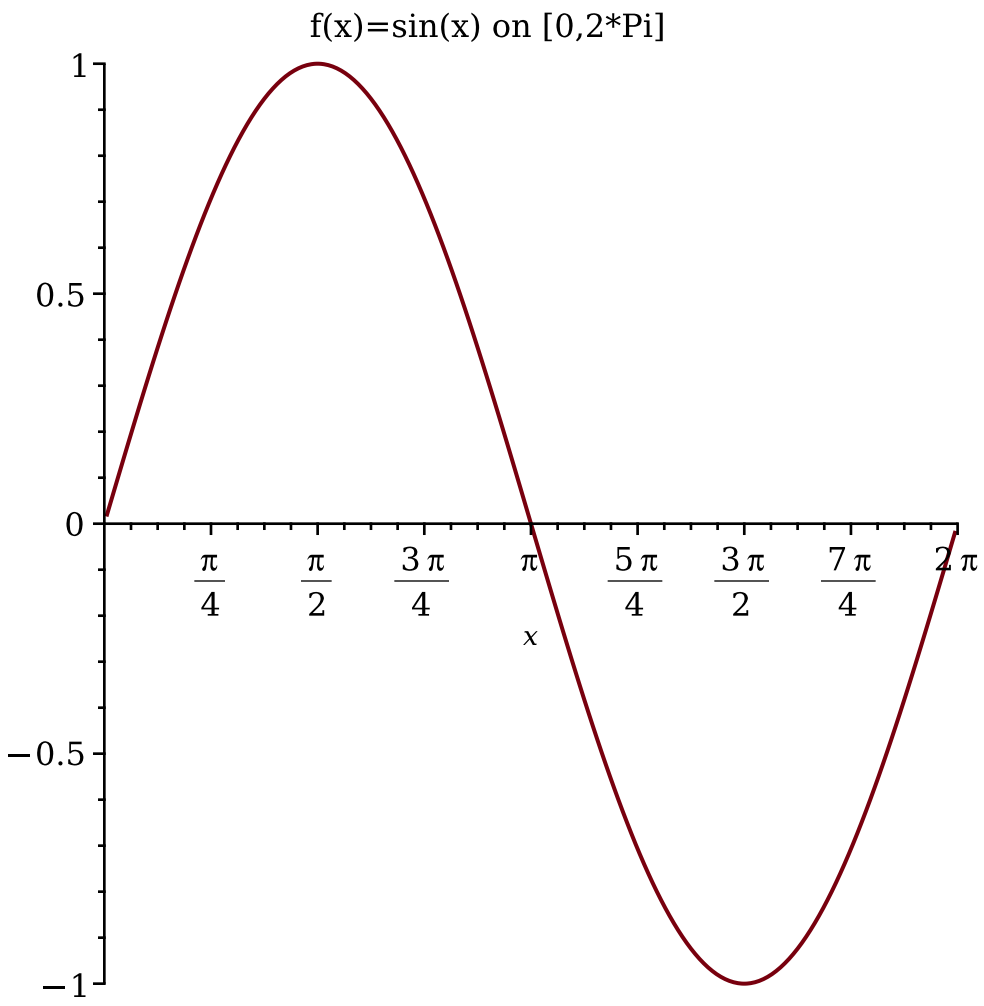
```
> limit( sin(x)/x , x = 0 )
```

$$1 \quad (43)$$

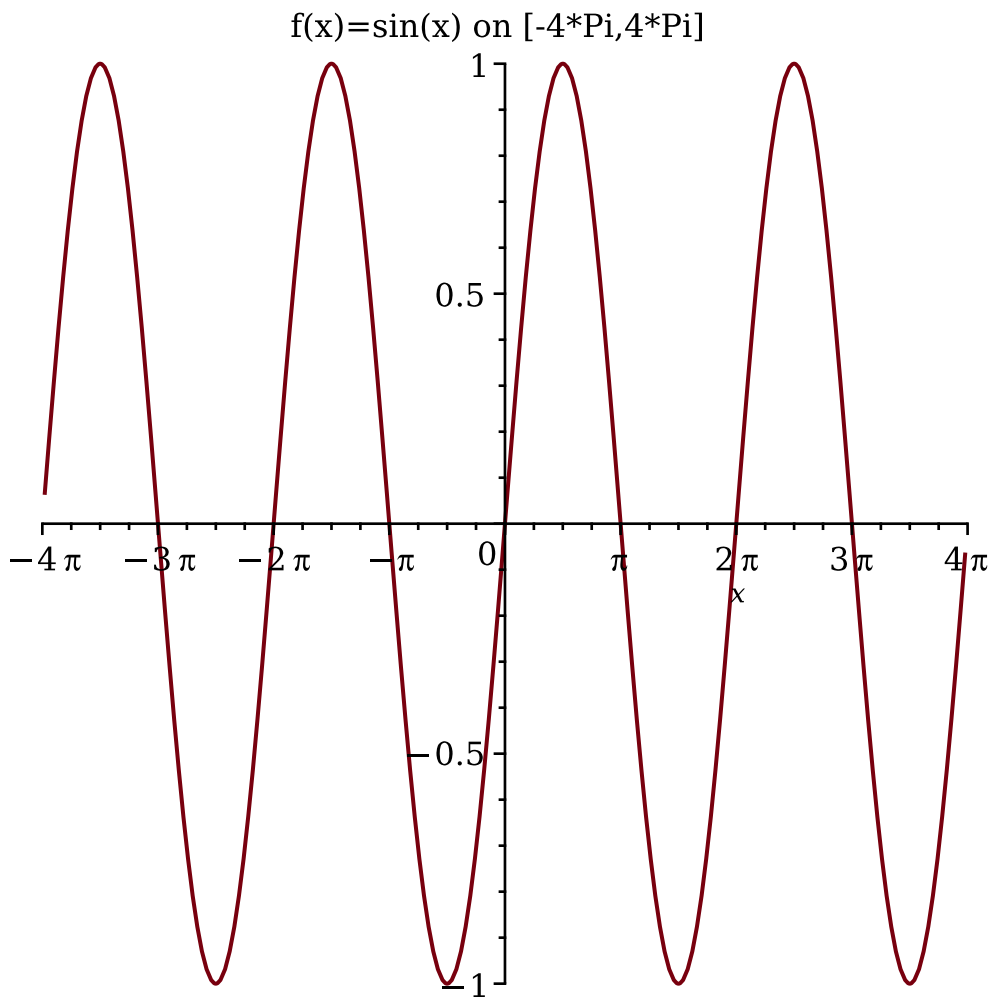
```
> limit( (cos(x) + 1)/(x - Pi) , x = Pi );
```

$$0 \quad (44)$$

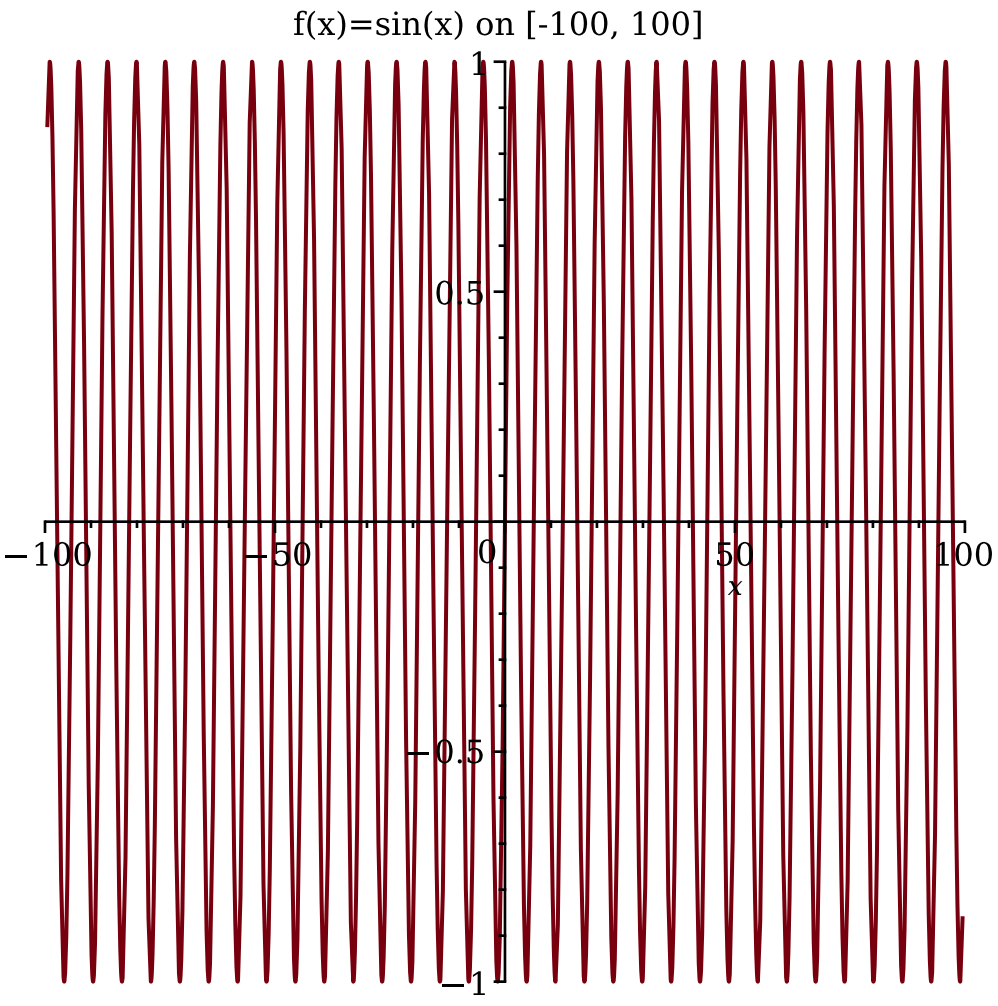
```
> #----------------------------------------EX11:
> #a)
> with(plots) :
> plot(sin(x), x = 0 ..2 ·Pi, title = "f(x)=sin(x) on [0,2·Pi]")
```



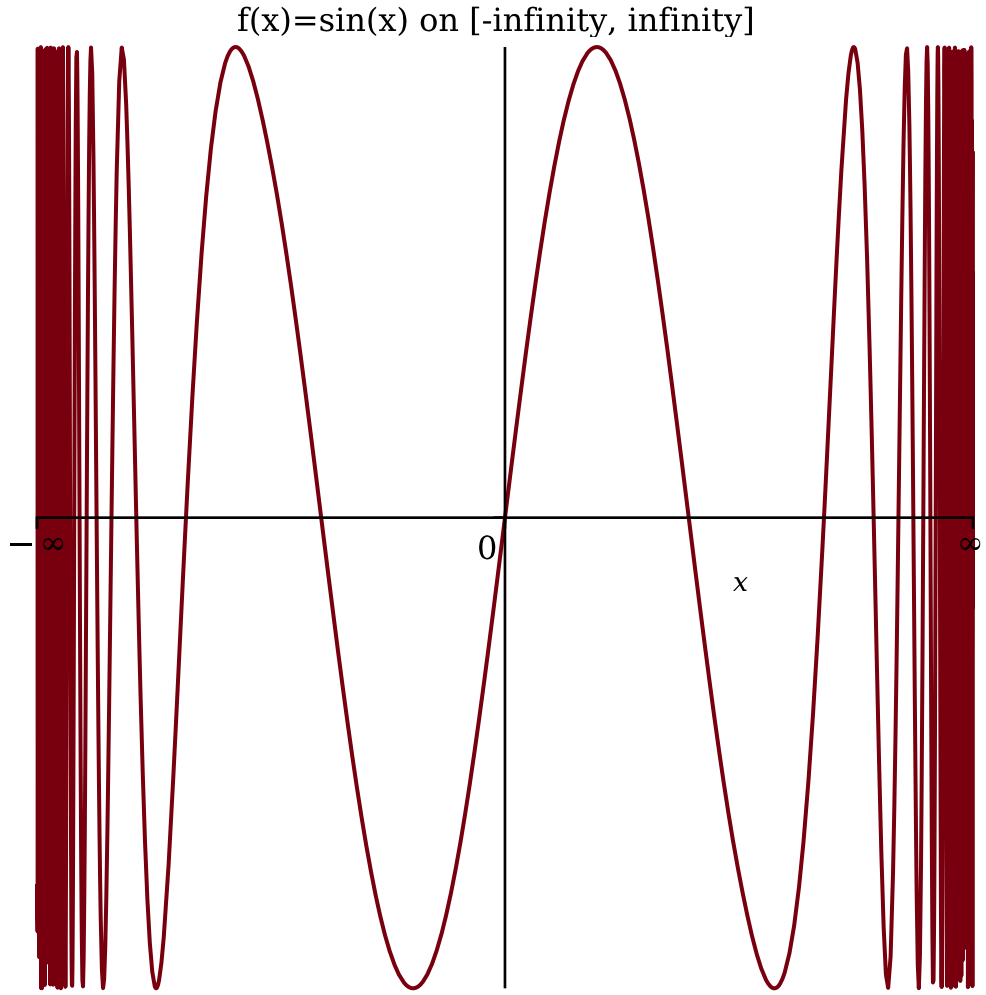

```
>
> #b)
> plot(sin(x), x=-4·Pi..4·Pi, title="f(x)=sin(x) on [-4·Pi,4·Pi]")
```




```
> #c)
> plot(sin(x), x=-100..100, title="f(x)=sin(x) on [-100, 100]");
```

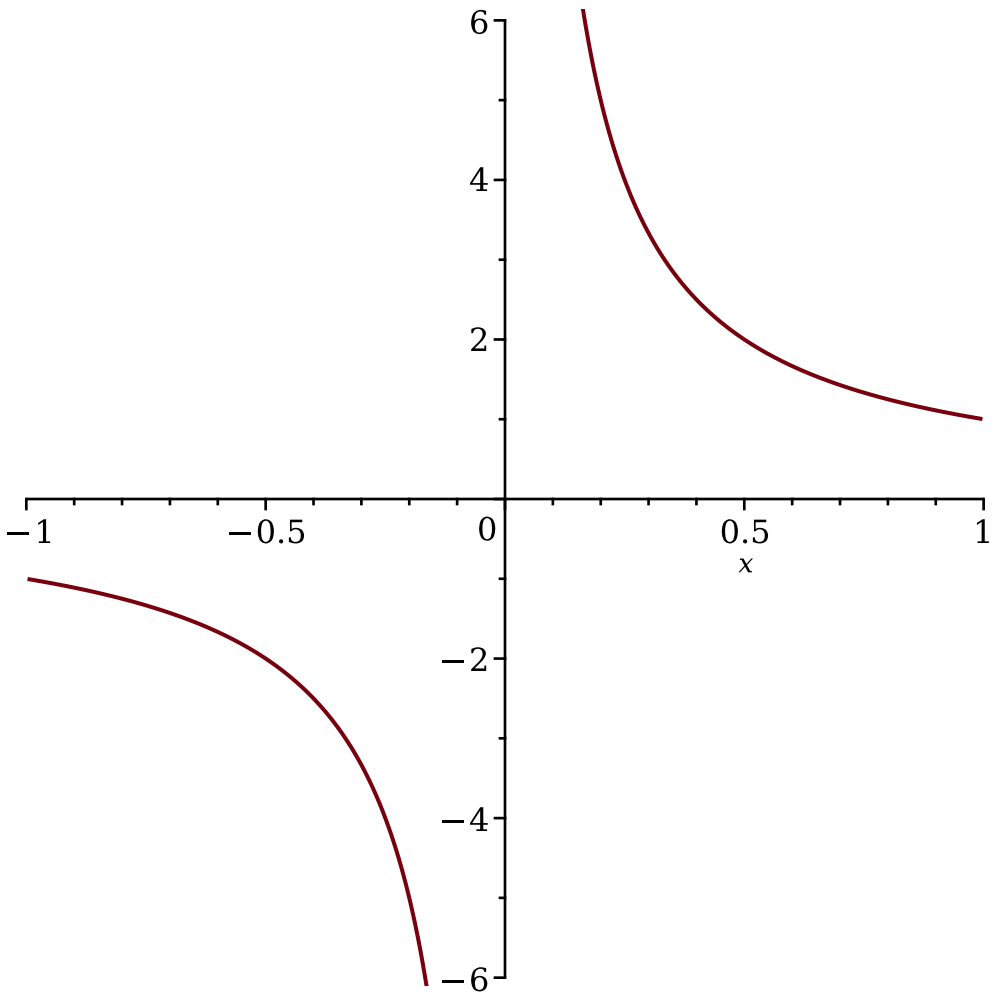



```
>
> #d)
> plot(sin(x), x = -infinity .. infinity , title = "f(x)=sin(x) on [-infinity, infinity]");
```




```
> #----------------------------------------------------------Ex12:
```

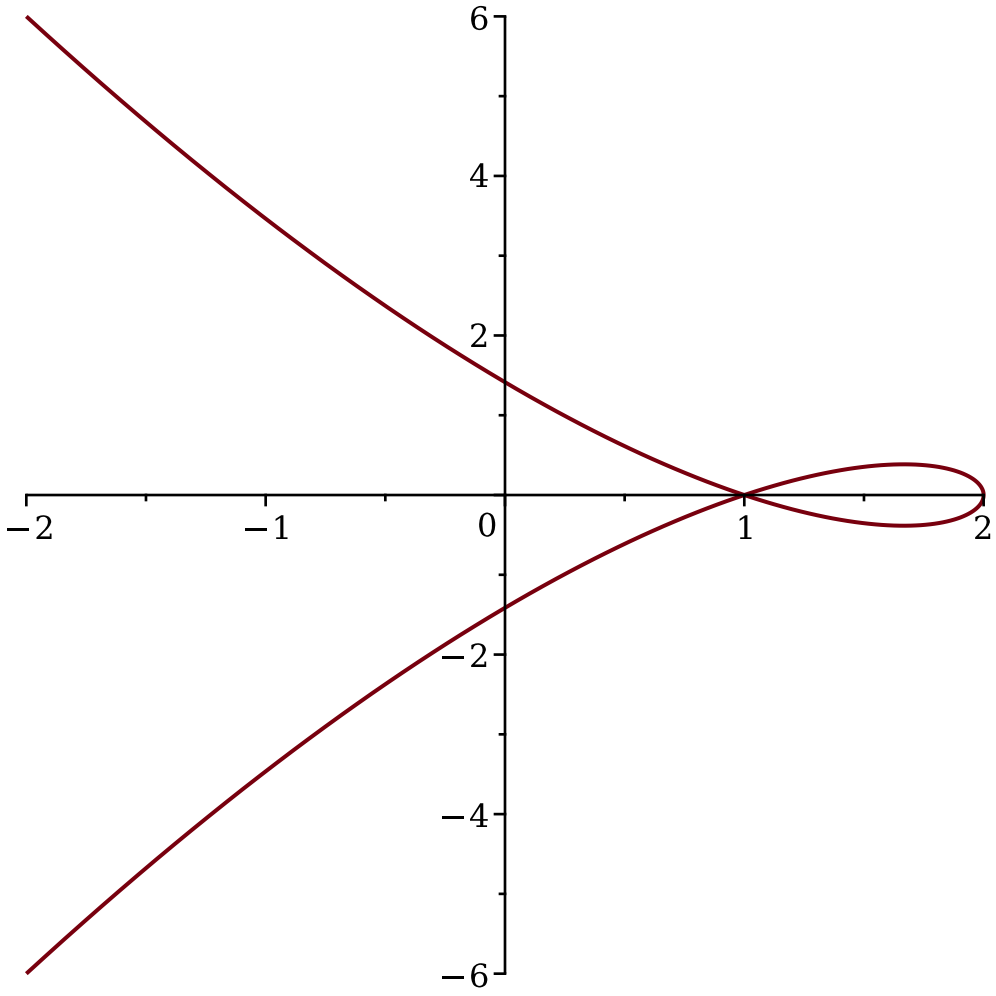
```
> plot(1/x, x=-1..1, discont=true);
```




```
> plot(1/x, x=-1..1, detect_poles=true)
```

Error, (in plot) unexpected option: detect_poles = true

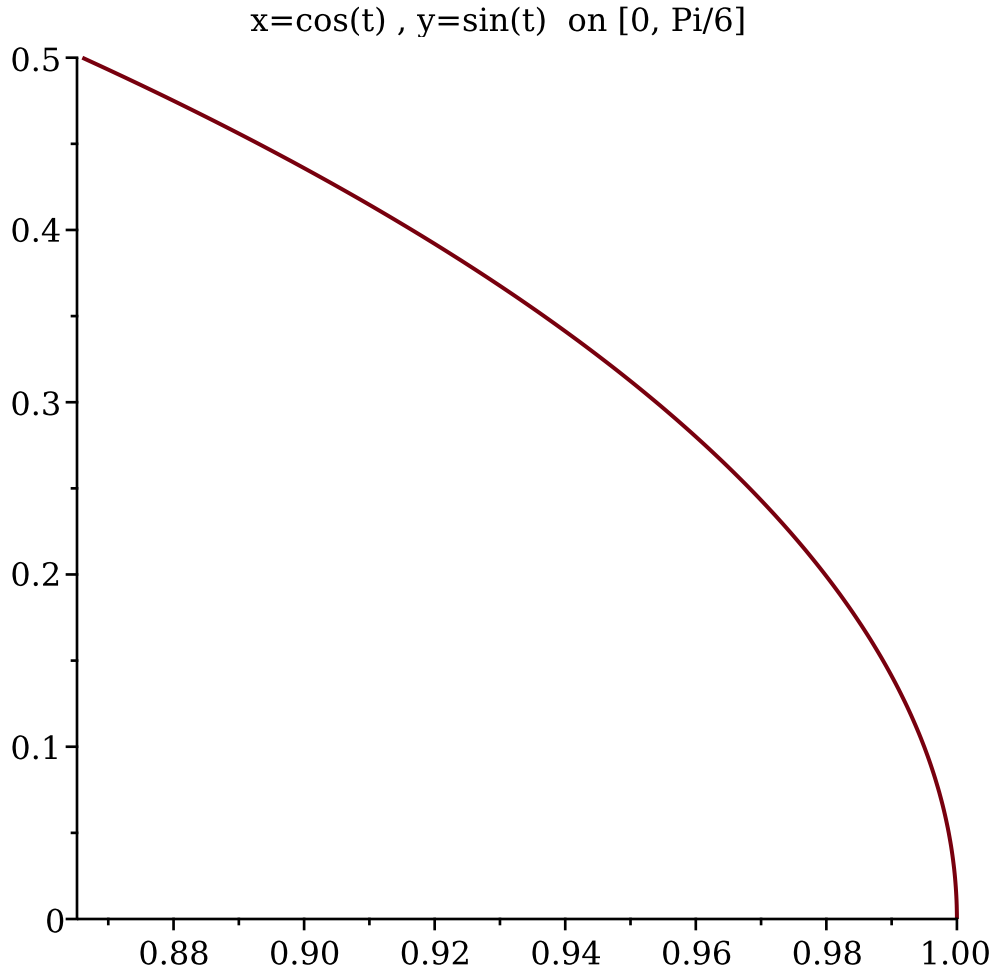
```
> #----------------------------------------------------------Ex13:
>
> plot([2-t^2, t-t^3, t=-2..2]);
```



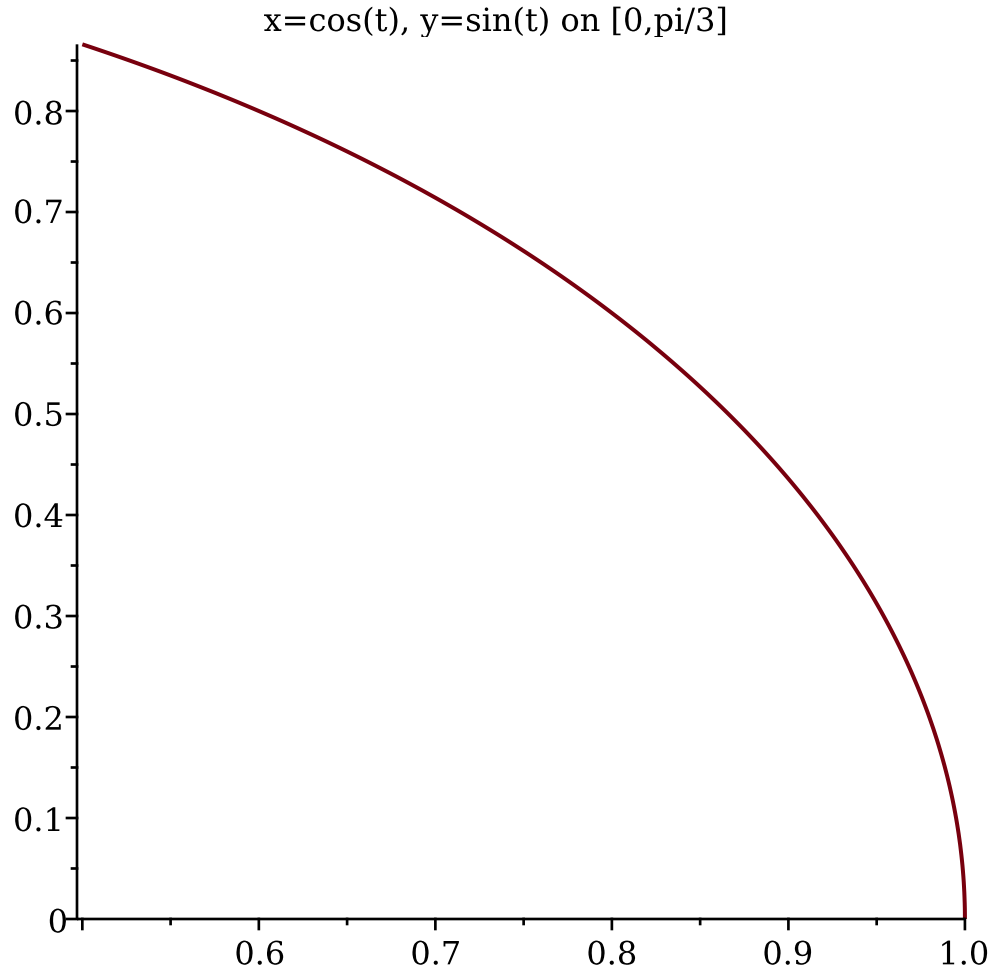

```
> #----------------------------------------------------------Ex14:
```

```
> a)
```

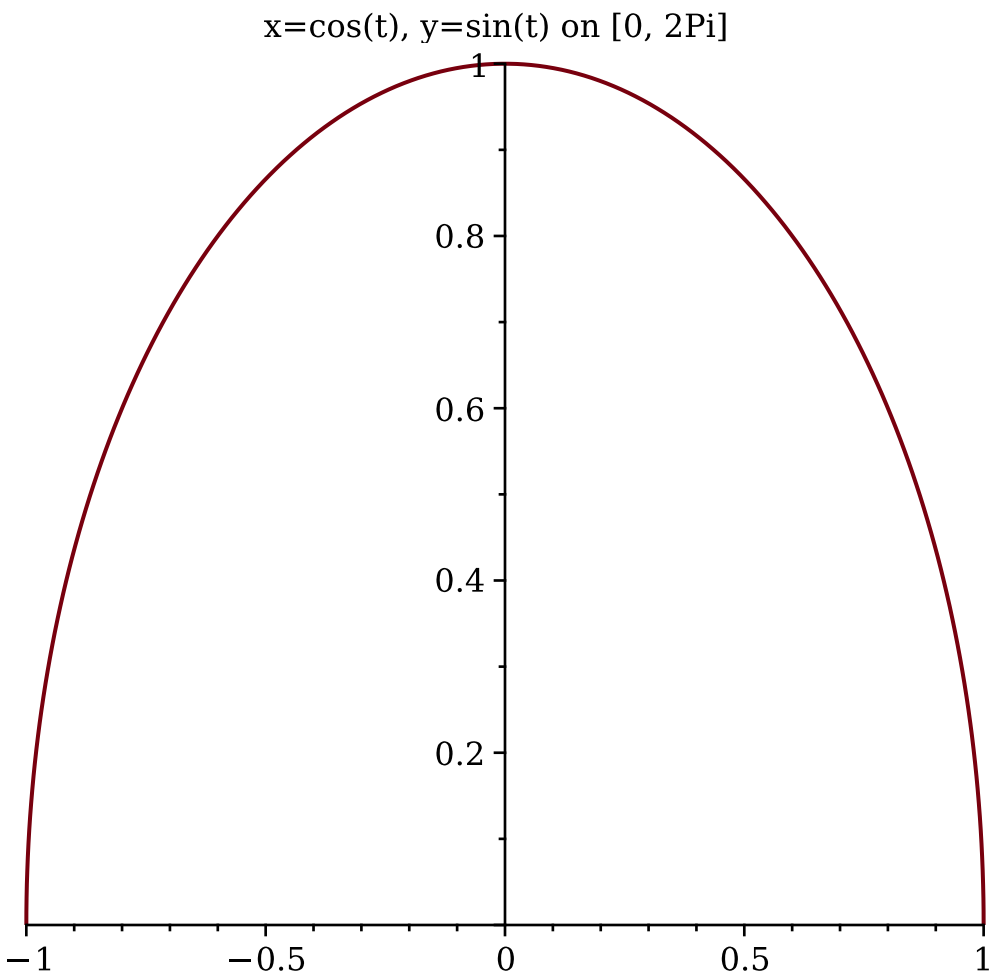
```
> plot([cos(t), sin(t) , t = 0..Pi/6], title = "x=cos(t) , y=sin(t)  on [0, Pi/6]")
```



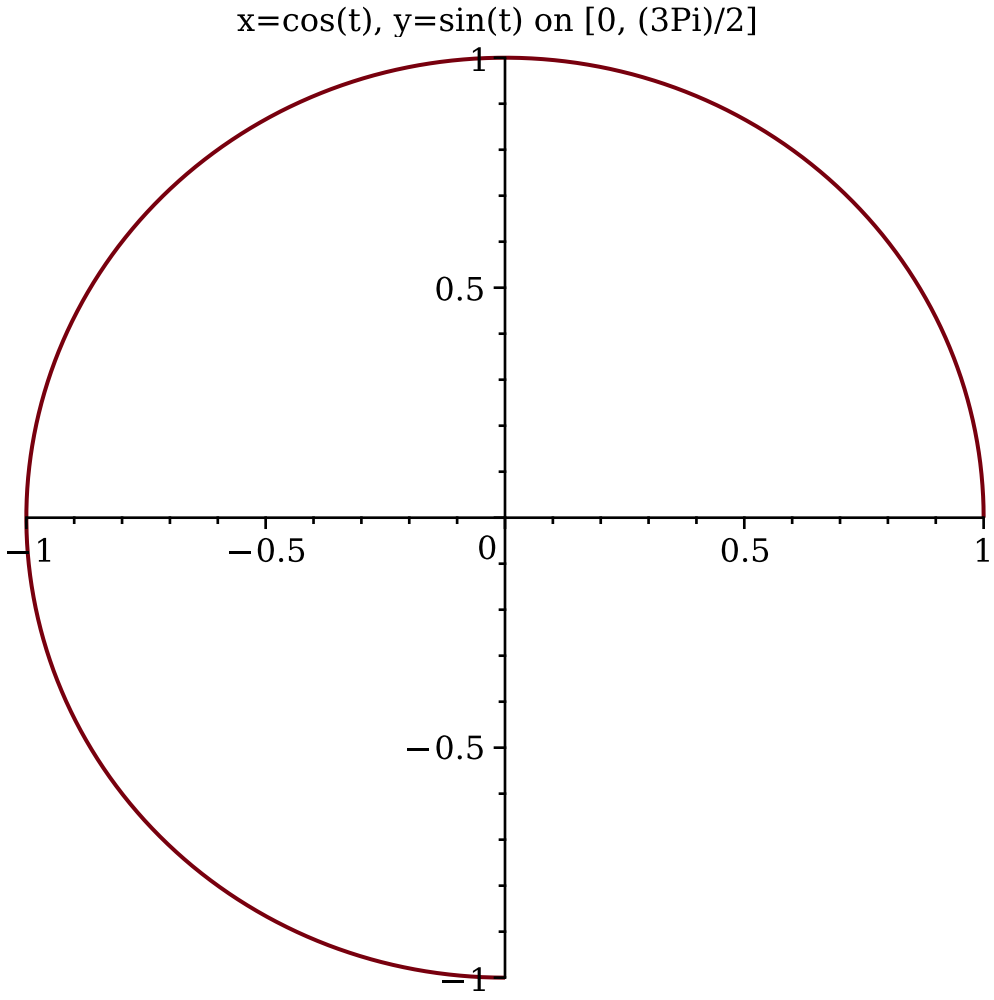

```
> #b)
> plot([cos(t), sin(t), t = 0..Pi/3], title = "x=cos(t), y=sin(t) on [0,pi/3]");
```



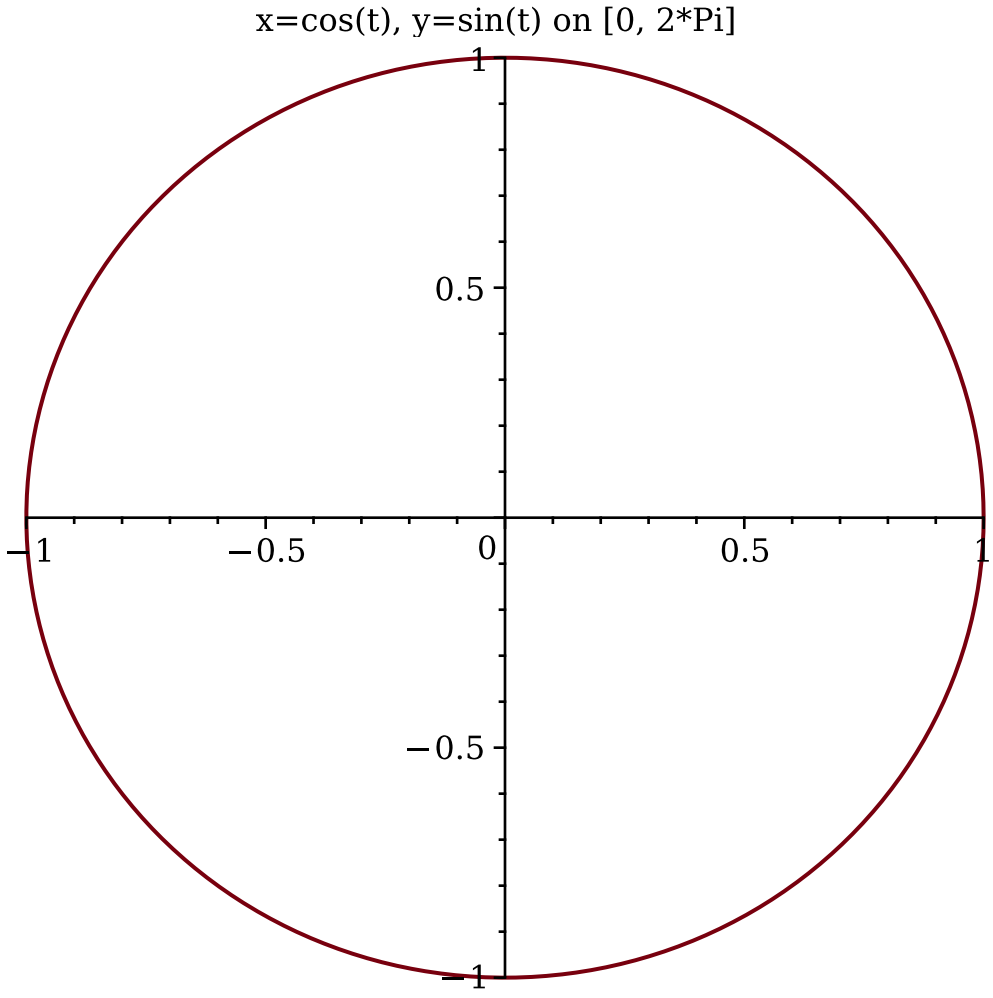

```
> #c)
> plot([cos(t), sin(t), t = 0..Pi], title = "x=cos(t), y=sin(t) on [0, 2Pi]");
```



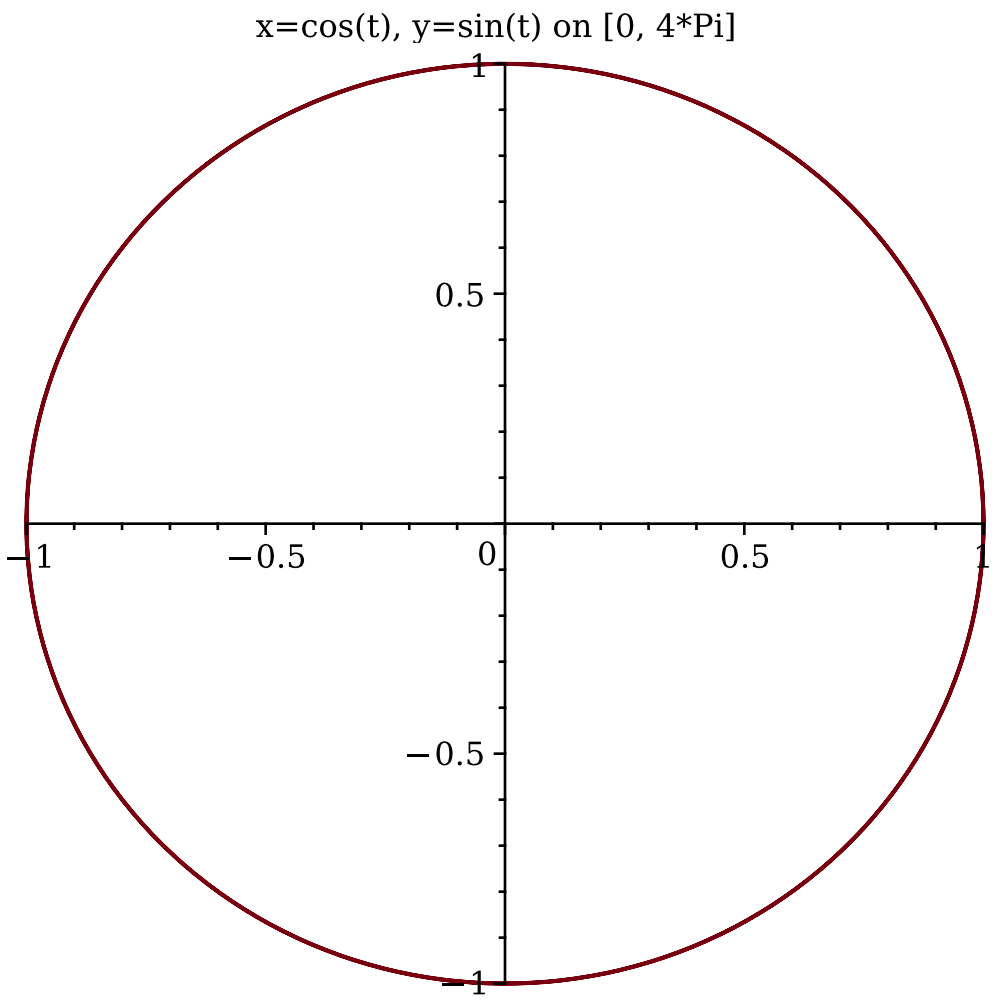

```
> #d)
> plot([cos(t), sin(t), t = 0..3*Pi/2], title = "x=cos(t), y=sin(t) on [0, (3Pi)/2]");
```




```
> #e)
> plot([cos(t), sin(t), t = 0..2·Pi], title = "x=cos(t), y=sin(t) on [0, 2·Pi]")
```



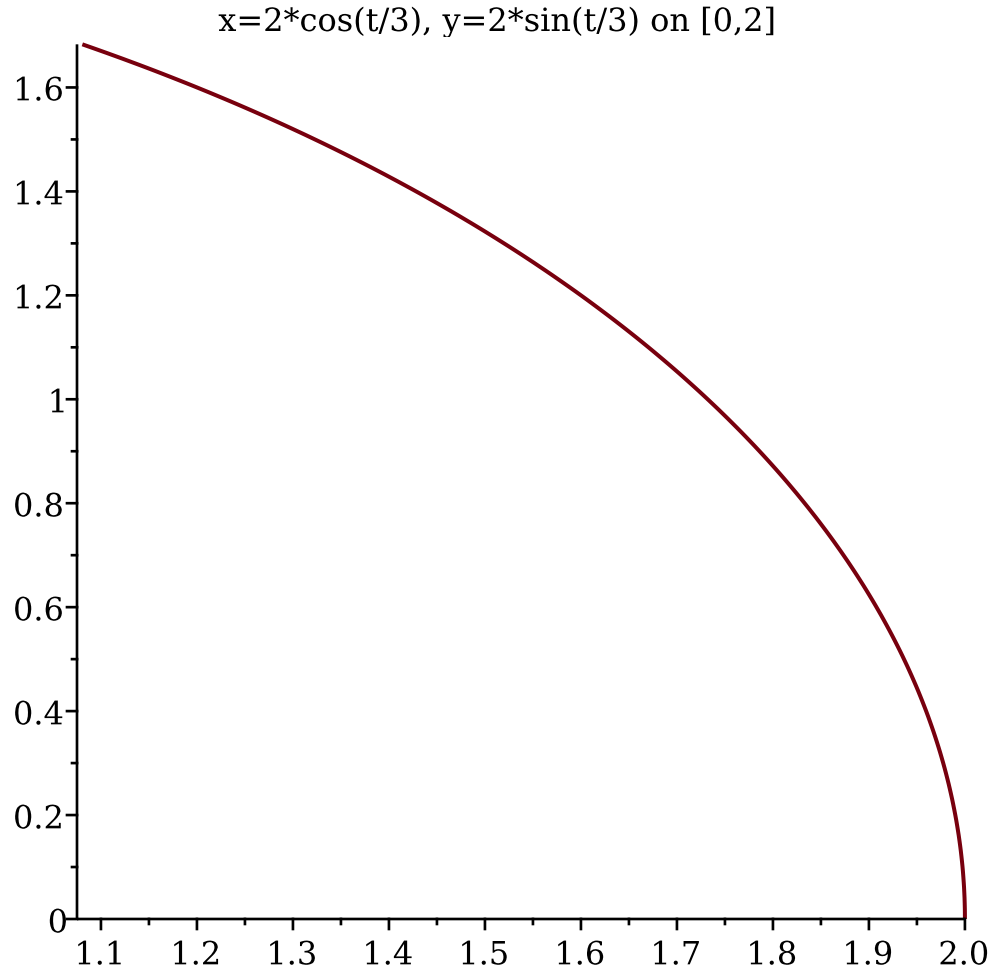

```
> #f)
> plot([cos(t), sin(t), t = 0..4·Pi], title = "x=cos(t), y=sin(t) on [0, 4·Pi]");
```



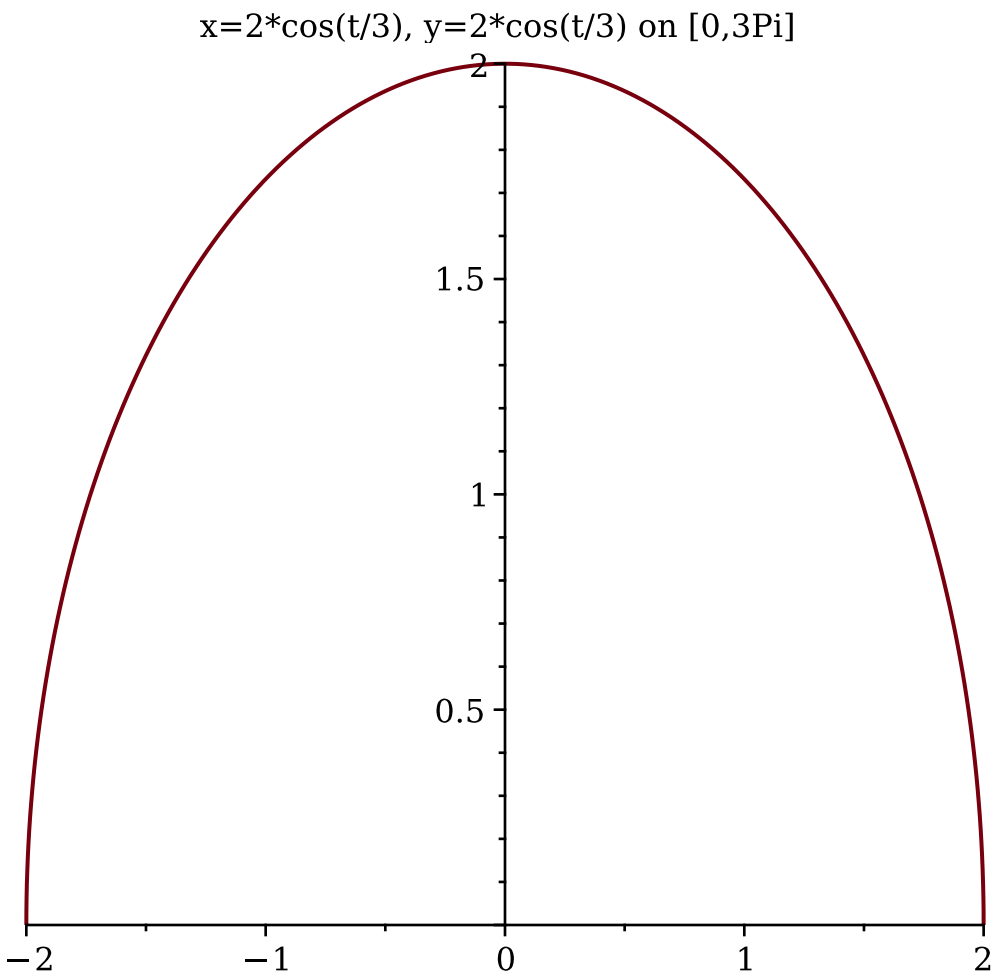

```
>
>
```

```
> #----------------------------------------------------------Ex15:
```

```
> #a)
> #1.
> plot([2·cos(t/3), 2·sin(t/3), t = 0..3], title
      = "x=2·cos(t/3), y=2·sin(t/3) on [0,2]");
```



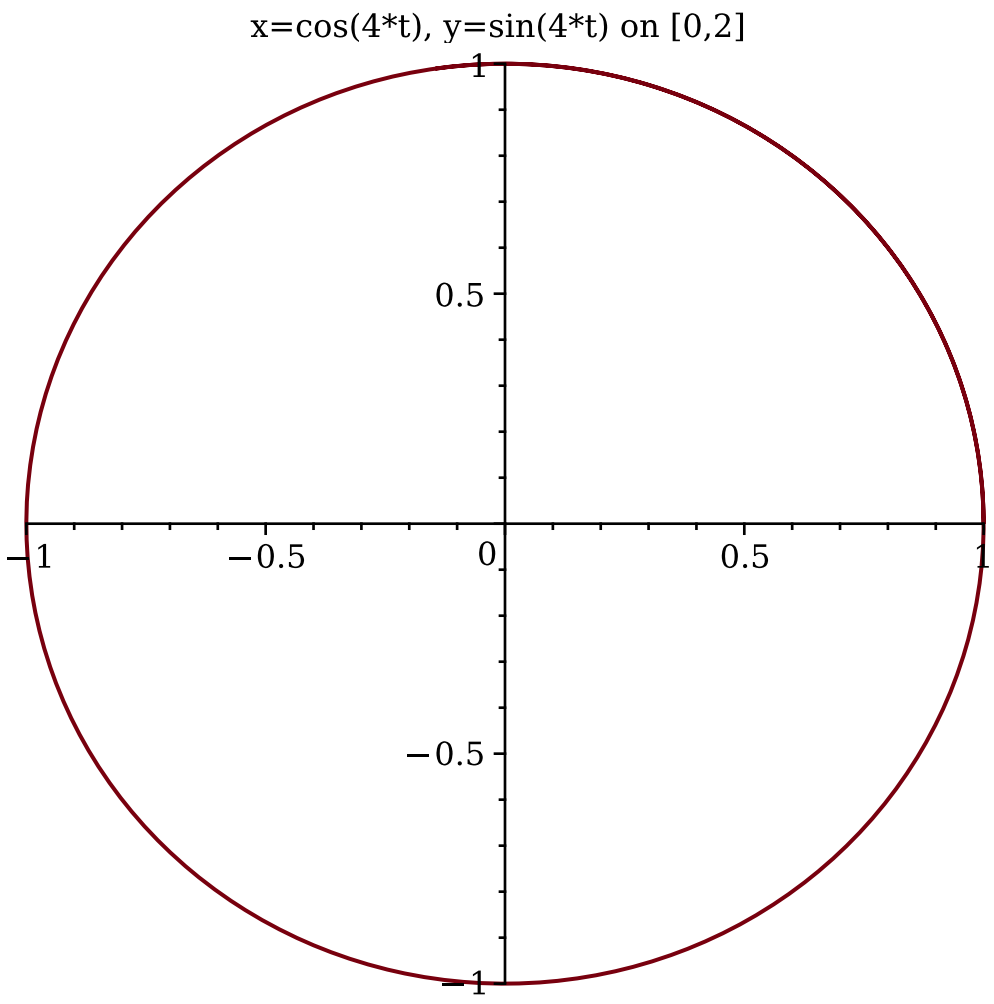

```
> #2.
> plot([2·cos(t/3), 2·sin(t/3), t = 0..3 Pi], title
      = "x=2·cos(t/3), y=2·cos(t/3) on [0,3Pi]");
```



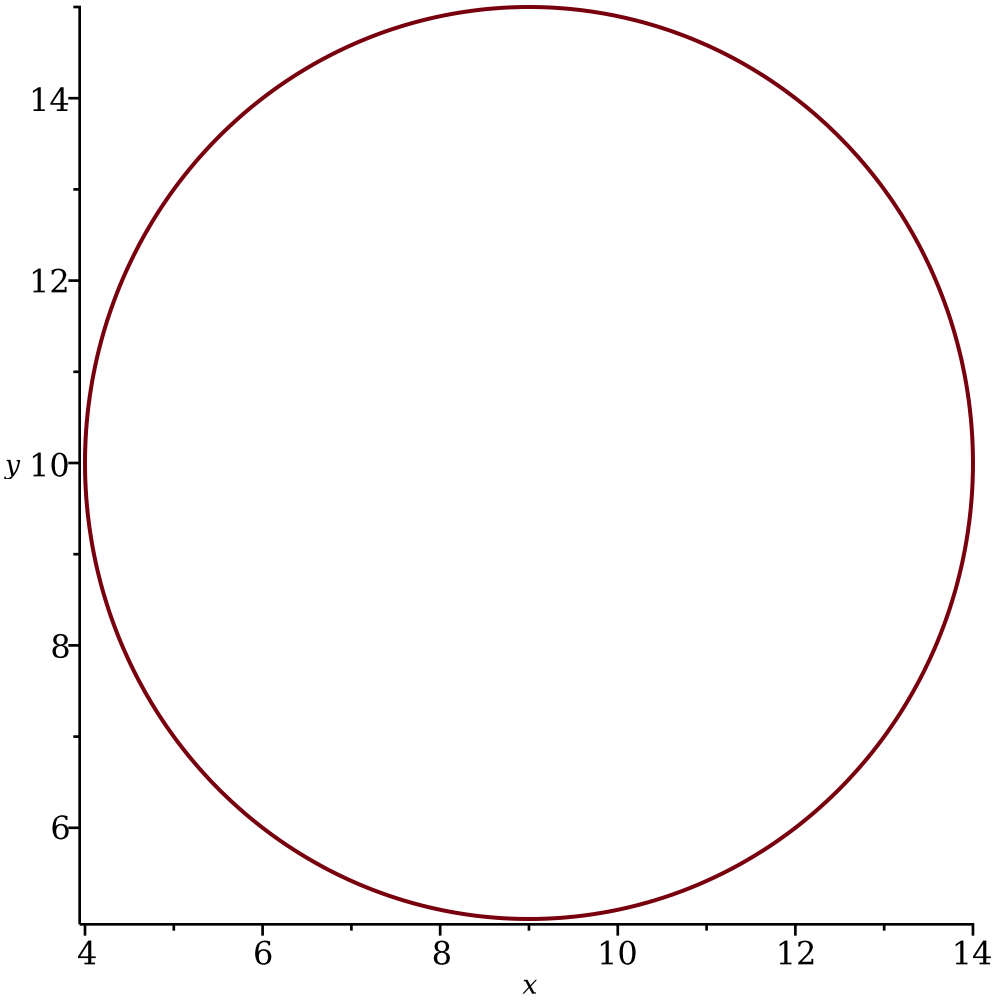

```
> # b)
>
```

plot **(45)**

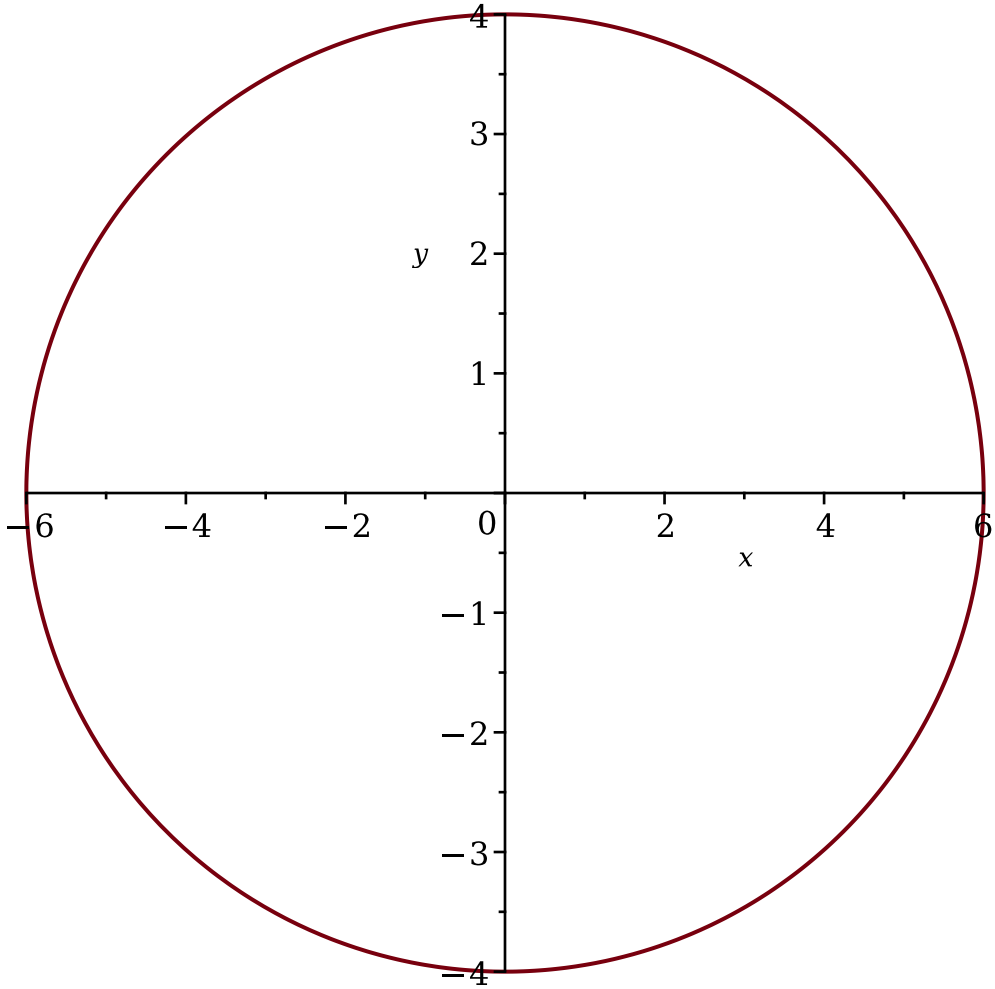
```
> plot([cos(4·t), sin(4·t), t = 0..2], title = "x=cos(4·t), y=sin(4·t) on [0,2]");
```



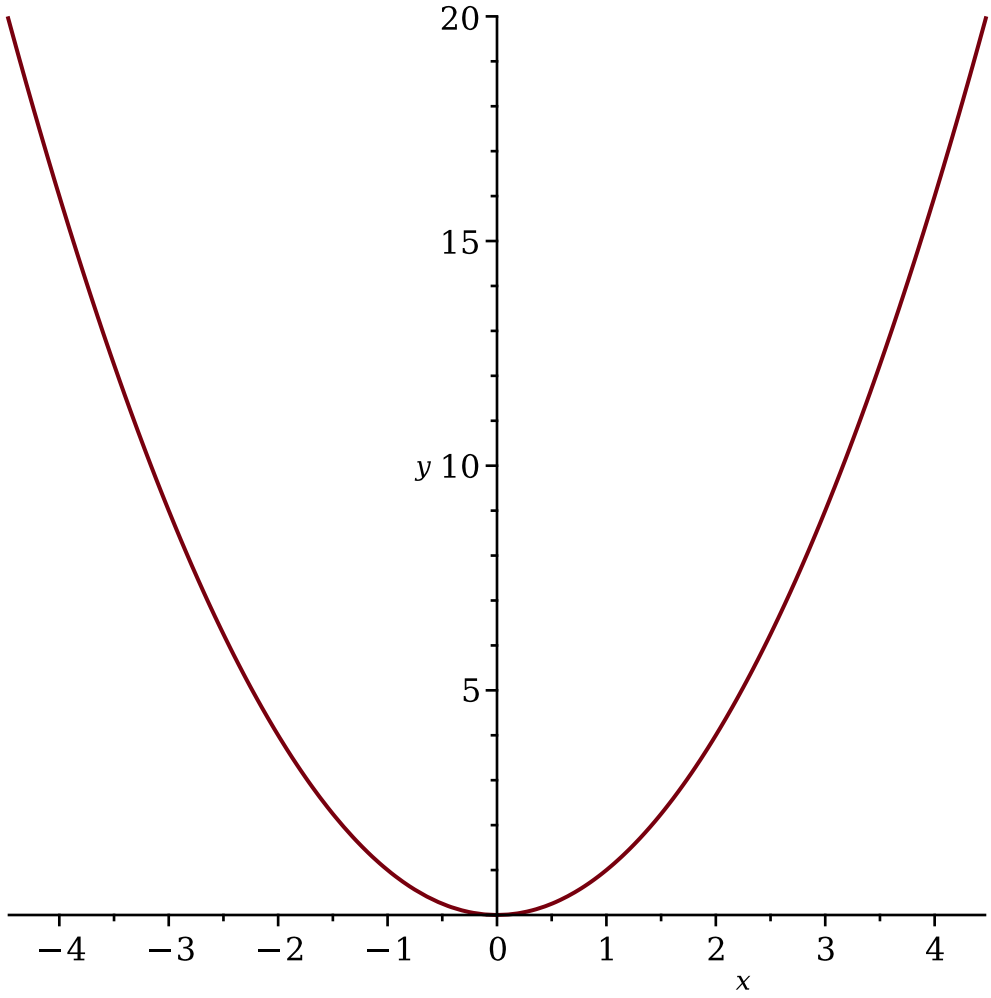

```
> #----------------------------------------------------------------Ex16:
> #circle
> plots[implicitplot]((x-9)^2+(y-10)^2=25,x=-20..20,y=-20..20);
```



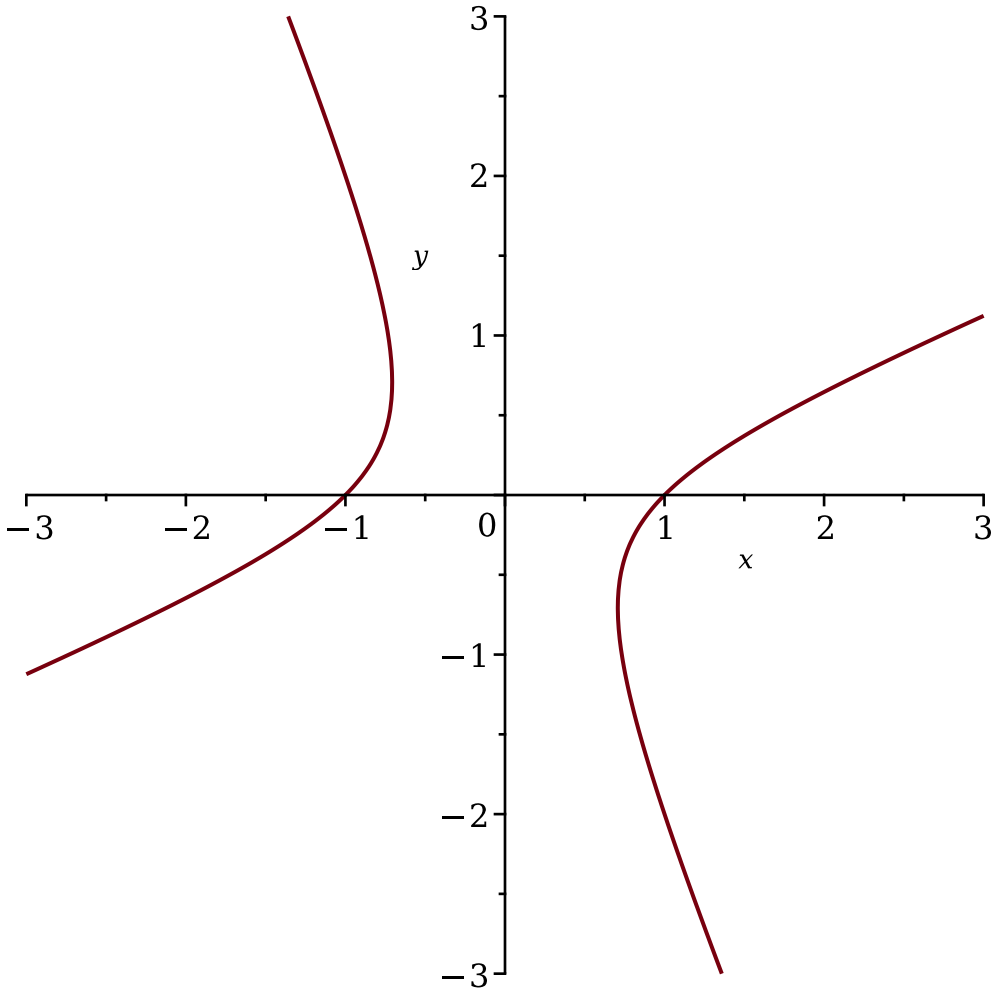

```
> #elipse
> plots[implicitplot]( x^2/36 + y^2/16 = 1 , x = -100000..100000, y = -5..5 );
  #??????????????????????
```



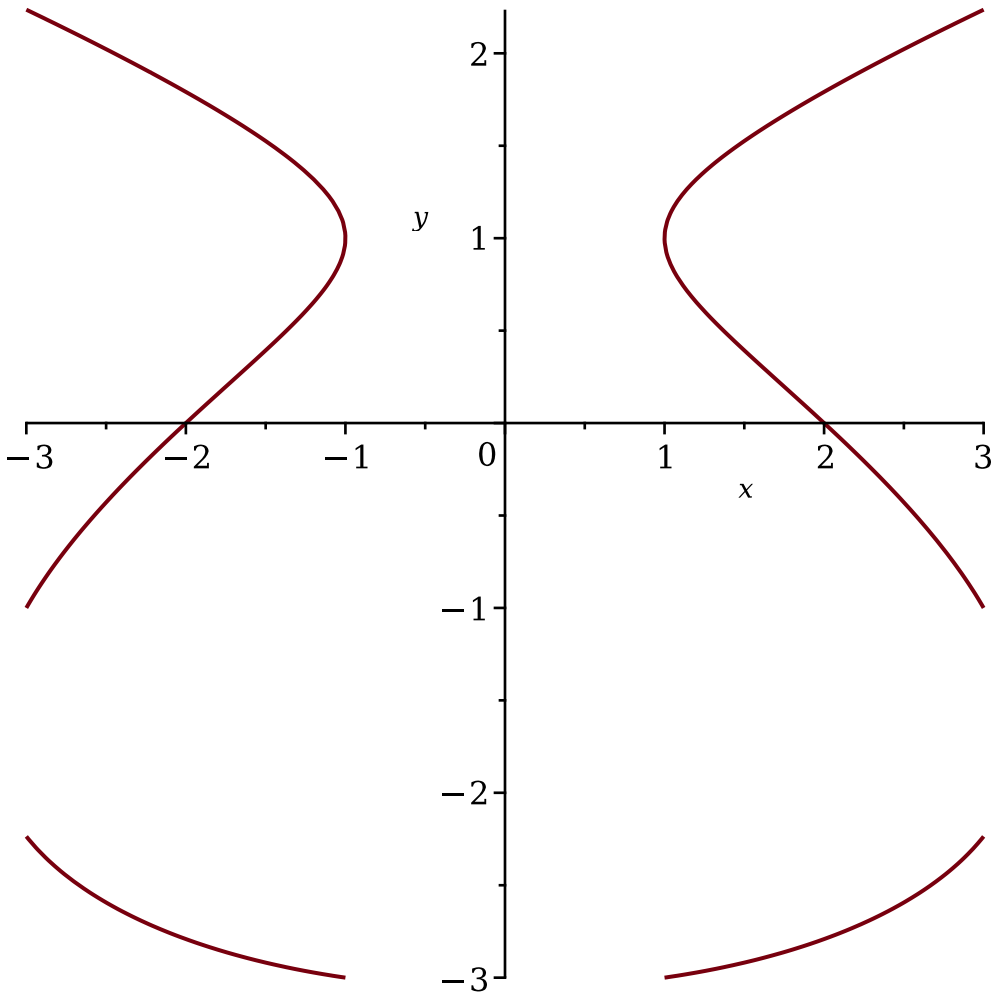

```
> #parabola
> plots[implicitplot](x^2 - y = 0, x = -20..20, y = -20..20);
```




```
> #----------------------------------------------------------Ex17:
>
> with(plots):
> implicitplot(x^2 - 2*x*y - y^2 = 1, x = -3..3, y = -3..3);
```

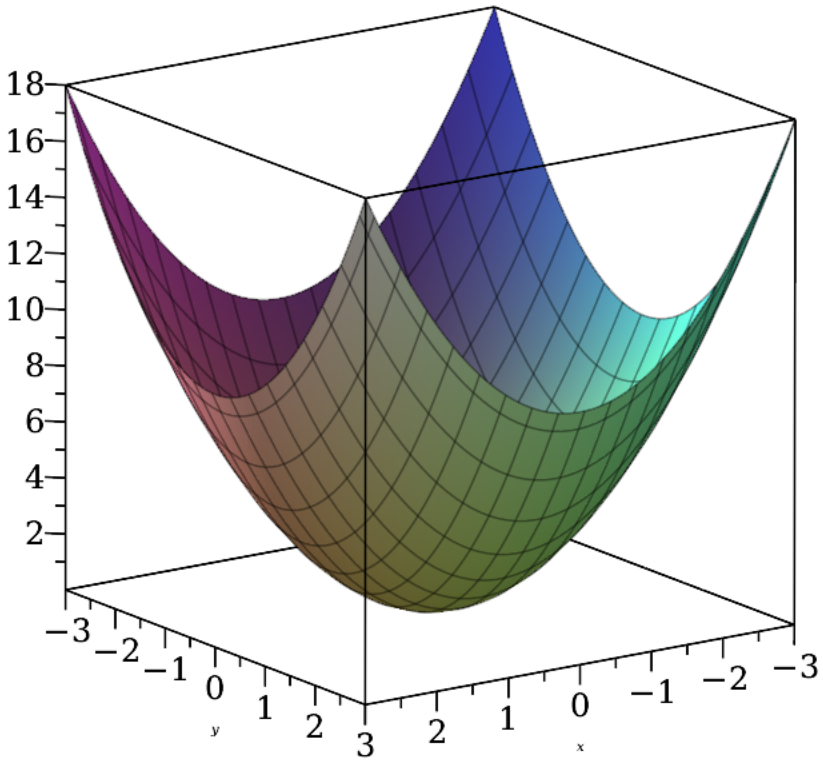



```
> implicitplot(y^3 + y^2 - 5*y - x^2 = -4, x = -3..3, y = -3..3);
```




```
> #----------------------------------------------------Ex18:
```

```
> with(plots) :
> plot3d(x^2 + y^2 , x = −3..3, y = −3..3 , axes = boxed, grid = [50, 50]);
```


18
16
14
12
10
8
6
4
2
−3
−2
−1
0
1
2
3
y
2
1
0
−1
−2
−3
x