Computergestuetzte Mathematik zur Analysis

Lektion 9 (17. Dezember)

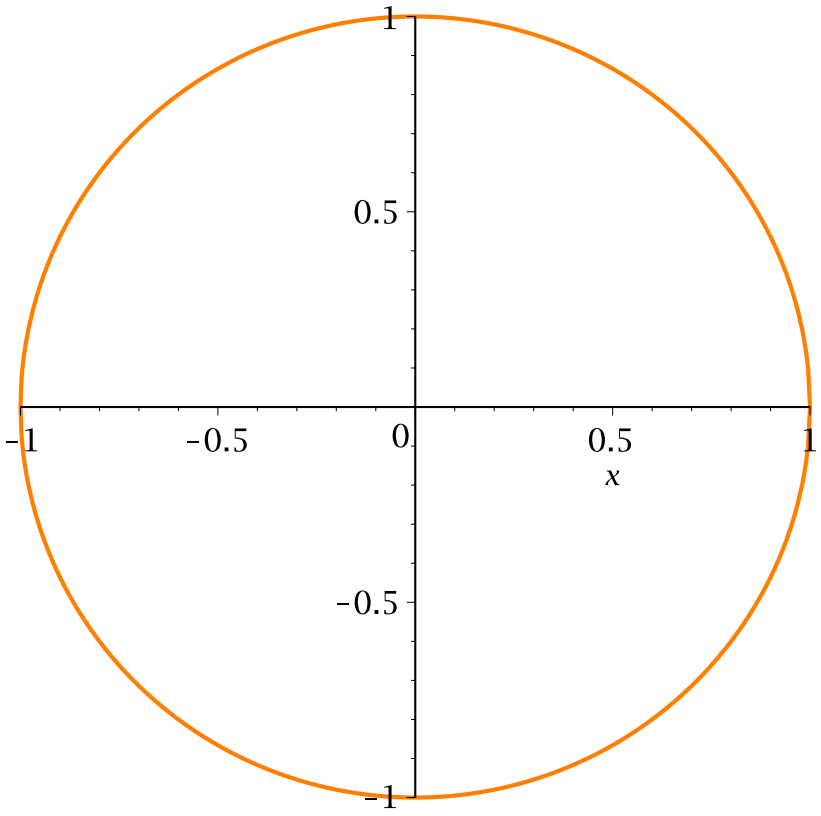
```
> restart: with(plots):
```

ebene parametrische Plots

```
> po := plot(sqrt(1-x^2),x = -1 .. 1,color = coral,thickness=2);
  pu := plot(-sqrt(1-x^2), x = -1 .. 1, color = coral, thickness
  = 2);
  display([po, pu]);
```

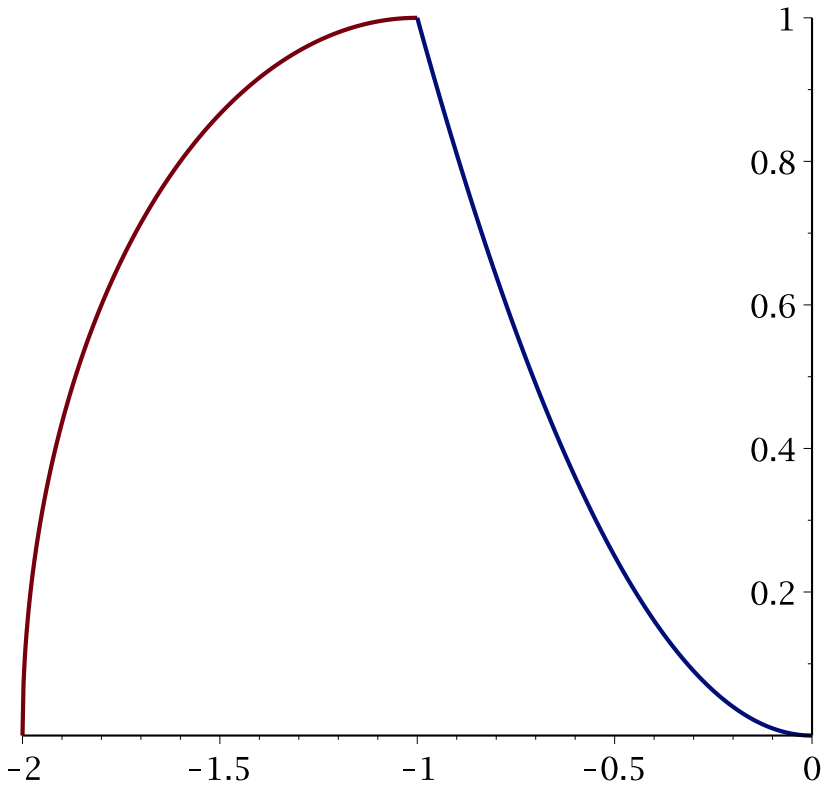
$$po := PLOT(\ldots)$$

$$pu := PLOT(\ldots)$$

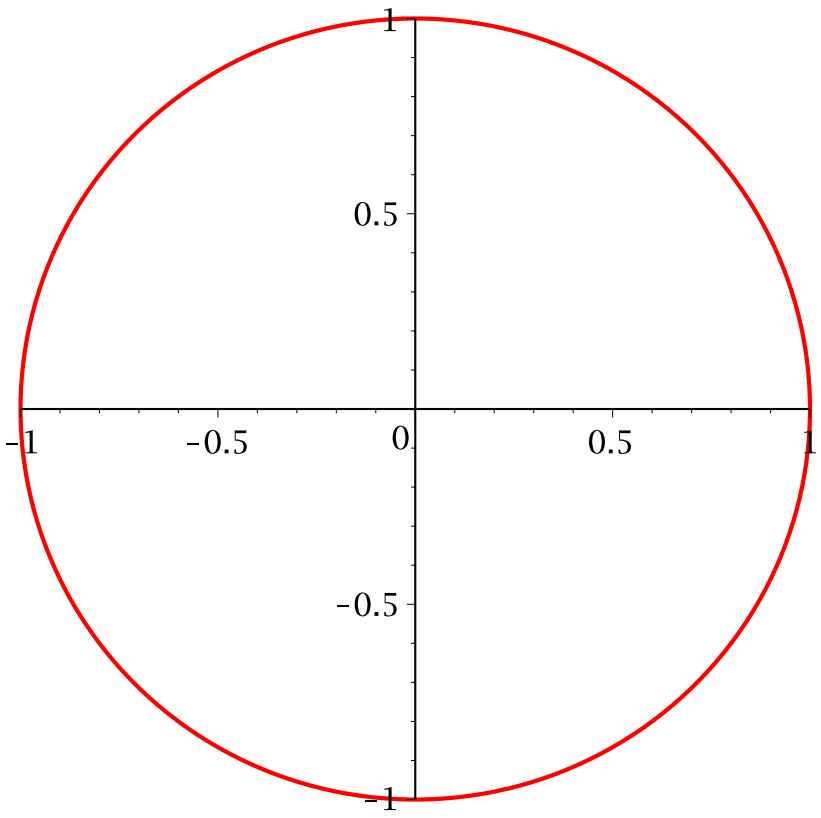



```
> plot([[x, sqrt(1-(x+1)^2), x = -2 .. -1], [x, x^2, x = -1 .. 0]
```

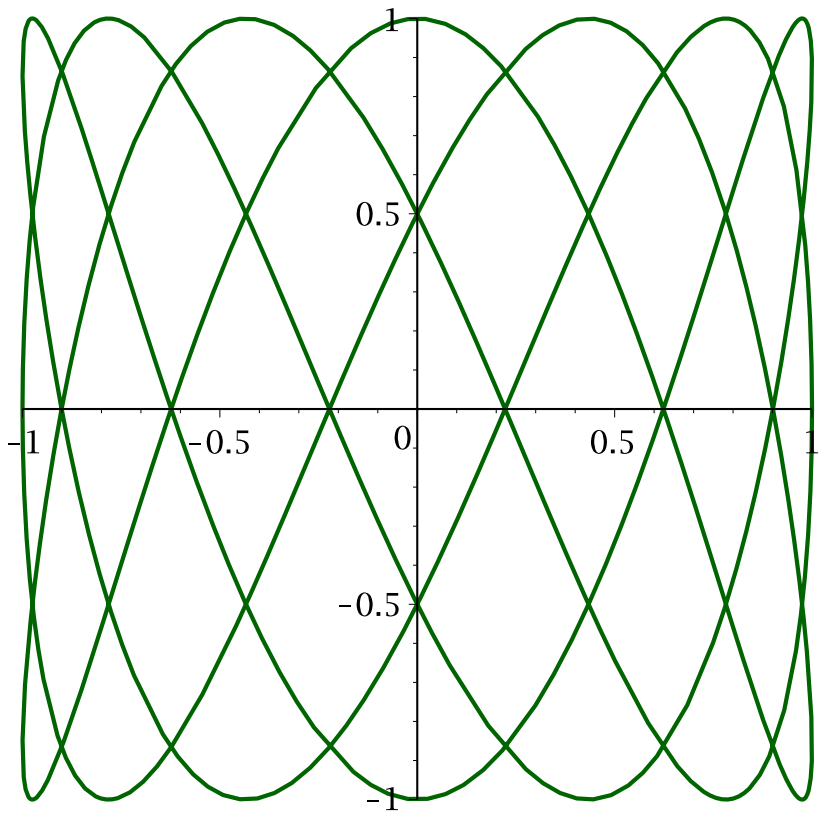
```
],thickness=2);
```




```
> plot([sin(t), cos(t), t = 0 .. 2*Pi], color = red, thickness =
  2);
```




```
> plot([cos(3*t), sin(7*t), t = 0 .. 2*Pi], color = "DarkGreen",
  thickness = 2); #Lissajous-Figur
```



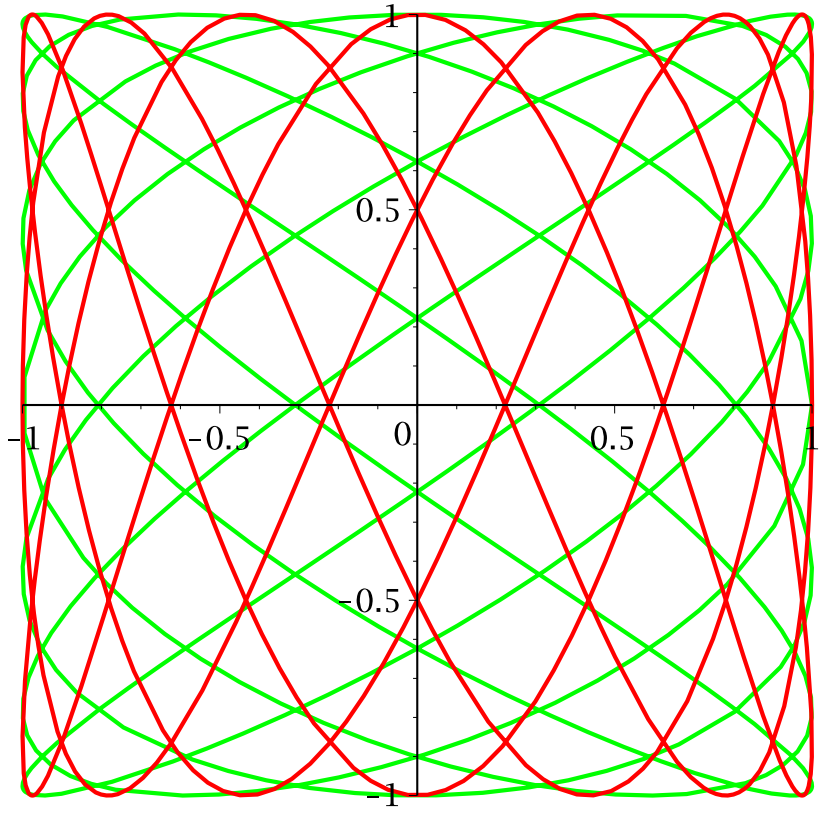

```
> Lis1 := [cos(7*t), sin(5*t), t = 0 .. 2*Pi];
```

$$Lis1 := [\cos(7\,t), \sin(5\,t), t = 0..2\,\pi] \quad \textbf{(1.1)}$$

```
> Lis2 := [cos(3*t), sin(7*t), t = 0 .. 2*Pi];
```

$$Lis2 := [\cos(3\,t), \sin(7\,t), t = 0..2\,\pi] \quad \textbf{(1.2)}$$

```
> plot([Lis1, Lis2], color = [green, red], thickness = 2);
```




```
> kreis := [cos,sin,0..2*Pi];
```

$$kreis := [\cos, \sin, 0..2\pi] \tag{1.3}$$

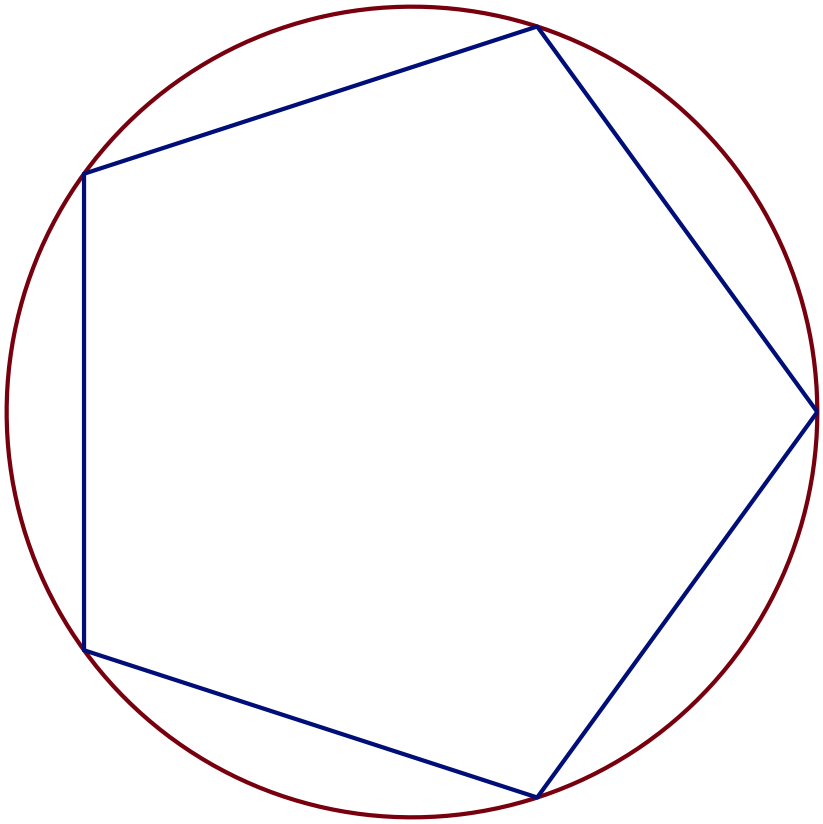
```
> w := seq([cos(2*Pi*j/5), sin(2*Pi*j/5)], j = 0 .. 5);
```

$$w := [1, 0], \left[\cos\left(\frac{2}{5}\pi\right), \sin\left(\frac{2}{5}\pi\right)\right], \left[-\cos\left(\frac{1}{5}\pi\right), \sin\left(\frac{1}{5}\pi\right)\right], \left[-\cos\left(\frac{1}{5}\pi\right), -\sin\left(\frac{1}{5}\pi\right)\right], \left[\cos\left(\frac{2}{5}\pi\right), -\sin\left(\frac{2}{5}\pi\right)\right], [1, 0] \tag{1.4}$$

```
> Pentagram := [seq(w[k], k = 1 .. 6)];
```

$$Pentagram := \left[[1, 0], \left[\cos\left(\frac{2}{5}\pi\right), \sin\left(\frac{2}{5}\pi\right)\right], \left[-\cos\left(\frac{1}{5}\pi\right), \sin\left(\frac{1}{5}\pi\right)\right], \left[-\cos\left(\frac{1}{5}\pi\right), -\sin\left(\frac{1}{5}\pi\right)\right], \left[\cos\left(\frac{2}{5}\pi\right), -\sin\left(\frac{2}{5}\pi\right)\right], [1, 0]\right] \tag{1.5}$$

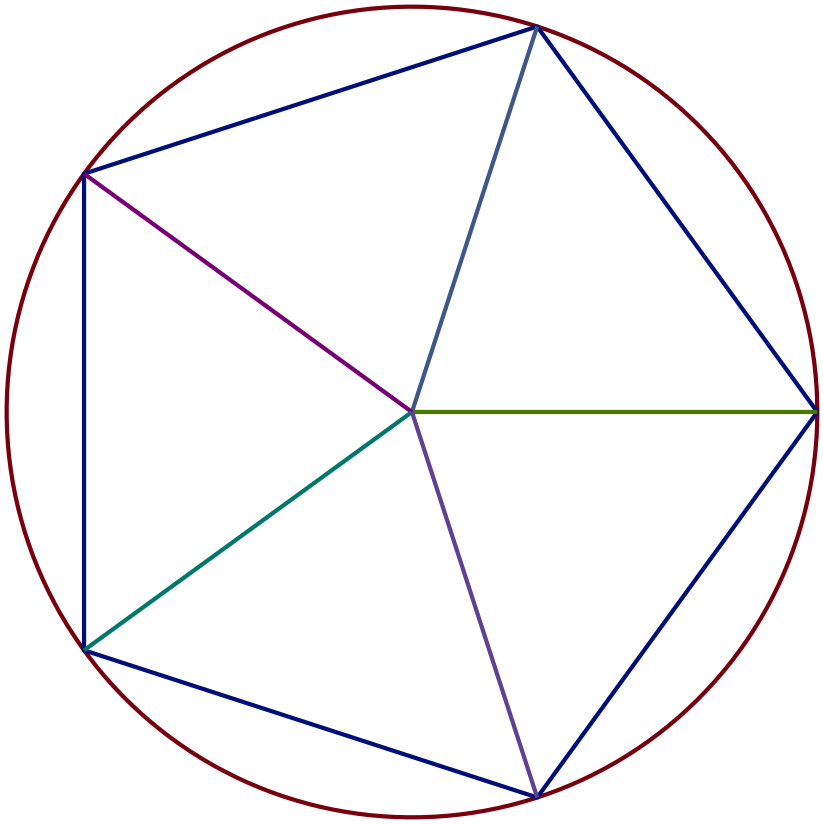
```
> plot([kreis, Pentagram], thickness = 2, scaling = constrained,
  axes='none');
```



```
> Stern := seq([[0, 0], w[k]], k = 1 .. 5);
```

$$Stern := [[0,0],[1,0]],\left[[0,0],\left[\cos\left(\frac{2}{5}\pi\right),\sin\left(\frac{2}{5}\pi\right)\right]\right],\left[[0,0],\left[-\cos\left(\frac{1}{5}\pi\right),\sin\left(\frac{1}{5}\pi\right)\right]\right],\left[[0,0],\left[-\cos\left(\frac{1}{5}\pi\right),-\sin\left(\frac{1}{5}\pi\right)\right]\right],\left[[0,0],\left[\cos\left(\frac{2}{5}\pi\right),-\sin\left(\frac{2}{5}\pi\right)\right]\right] \tag{1.6}$$

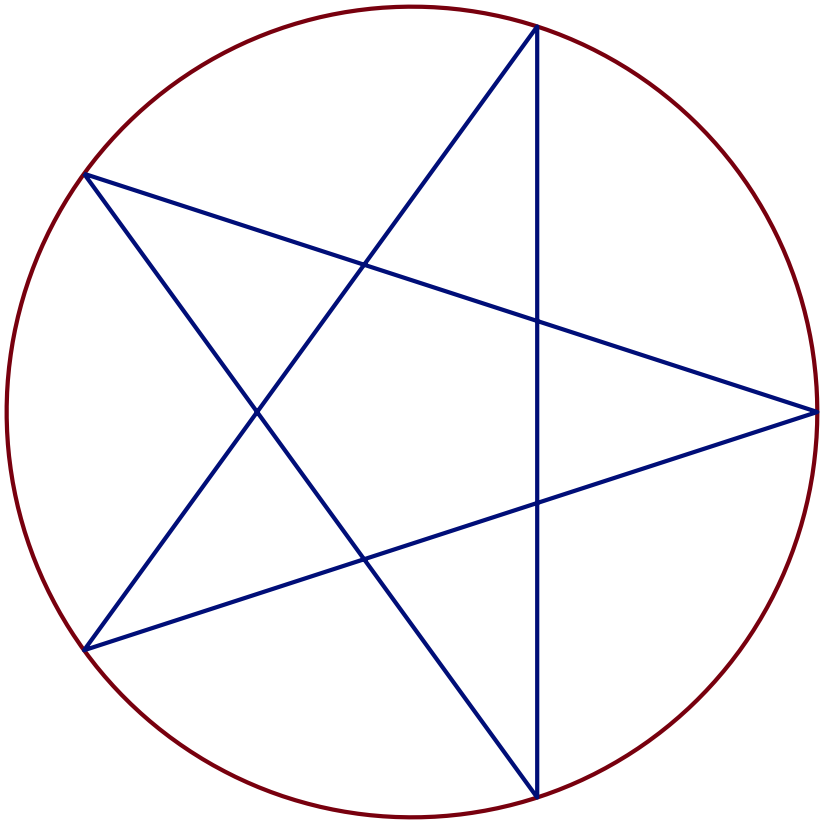
```
> plot([kreis, Pentagram, Stern], thickness = 2, scaling =
  constrained, axes = 'none');
```



```
> Pentagram2 := [seq(w[2*k mod 5+1], k = 1 .. 6)];
```

$$Pentagram2 := \left[\left[-\cos\left(\frac{1}{5}\pi\right), \sin\left(\frac{1}{5}\pi\right)\right], \left[\cos\left(\frac{2}{5}\pi\right), -\sin\left(\frac{2}{5}\pi\right)\right], \left[\cos\left(\frac{2}{5}\pi\right), \sin\left(\frac{2}{5}\pi\right)\right], \left[-\cos\left(\frac{1}{5}\pi\right), -\sin\left(\frac{1}{5}\pi\right)\right], [1, 0], \left[-\cos\left(\frac{1}{5}\pi\right), \sin\left(\frac{1}{5}\pi\right)\right]\right] \quad (1.7)$$

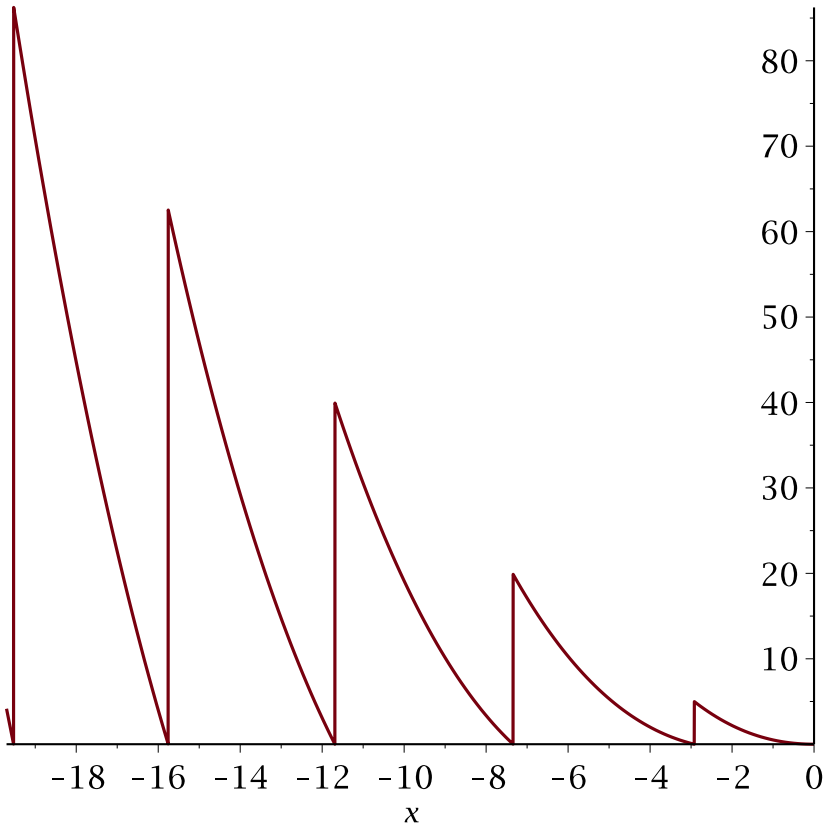
```
> plot([kreis,Pentagram2], thickness = 2, scaling = constrained,
  axes='none');
```



```
> f1:= x-> (-x)^(3/2)*((3/2)^(sqrt(-x))-floor((3/2)^(sqrt(-x))));
```

$$f1 := x \to (-x)^{3/2}\left(\left(\frac{3}{2}\right)^{\sqrt{-x}} - \mathrm{floor}\left(\left(\frac{3}{2}\right)^{\sqrt{-x}}\right)\right) \qquad \textbf{(1.8)}$$

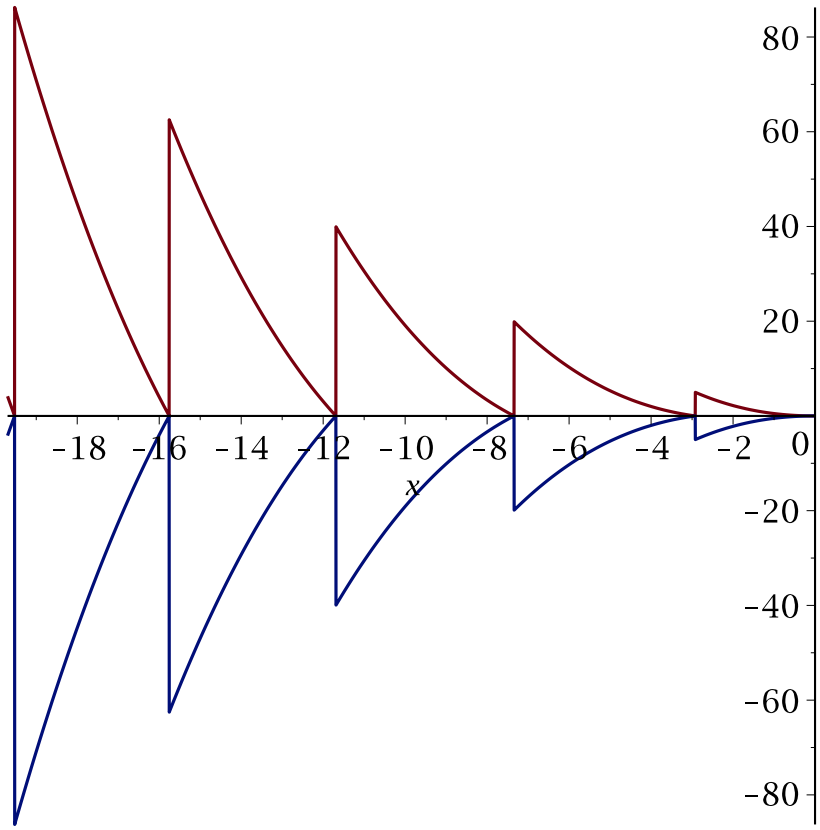
```
> plot(f1(x),x=-19.7..0);
```




```
> p2:=plot([f1(x), -f1(x)],x=-19.7..0);
```

$$p2 := PLOT(\ldots) \tag{1.9}$$

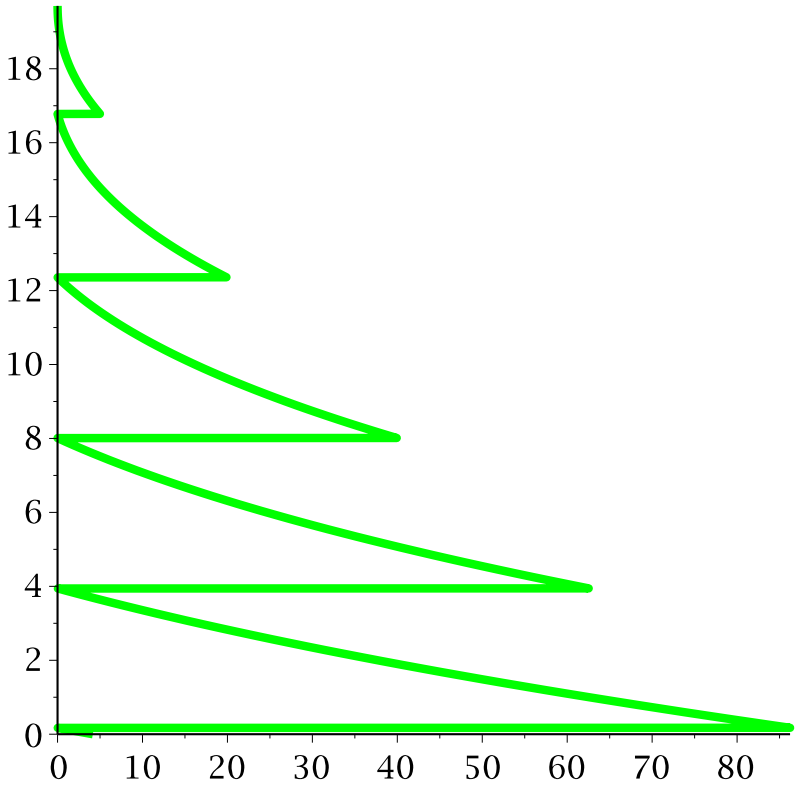
```
> display(p2);
```




```
> p3:=plot([f1(x),x+19.7,x=-19.7..0],thickness=4,color=green);  #
  Aufrichten des Weihnachtsbaums
```

$$p3 := PLOT(\ldots) \qquad \textbf{(1.10)}$$

```
> display(p3);
```




```
> p4:=plot([-f1(x),x+19.7,x=-19.7..0],thickness=4,color=green);
```

$$p4 := PLOT(\ldots) \tag{1.11}$$

```
> p5:=plot([[-2,0],[-2,-3],[2,-3],[2,0]],thickness=4,color=brown)
  :
> display(p3,p4,p5,axes=none);
```