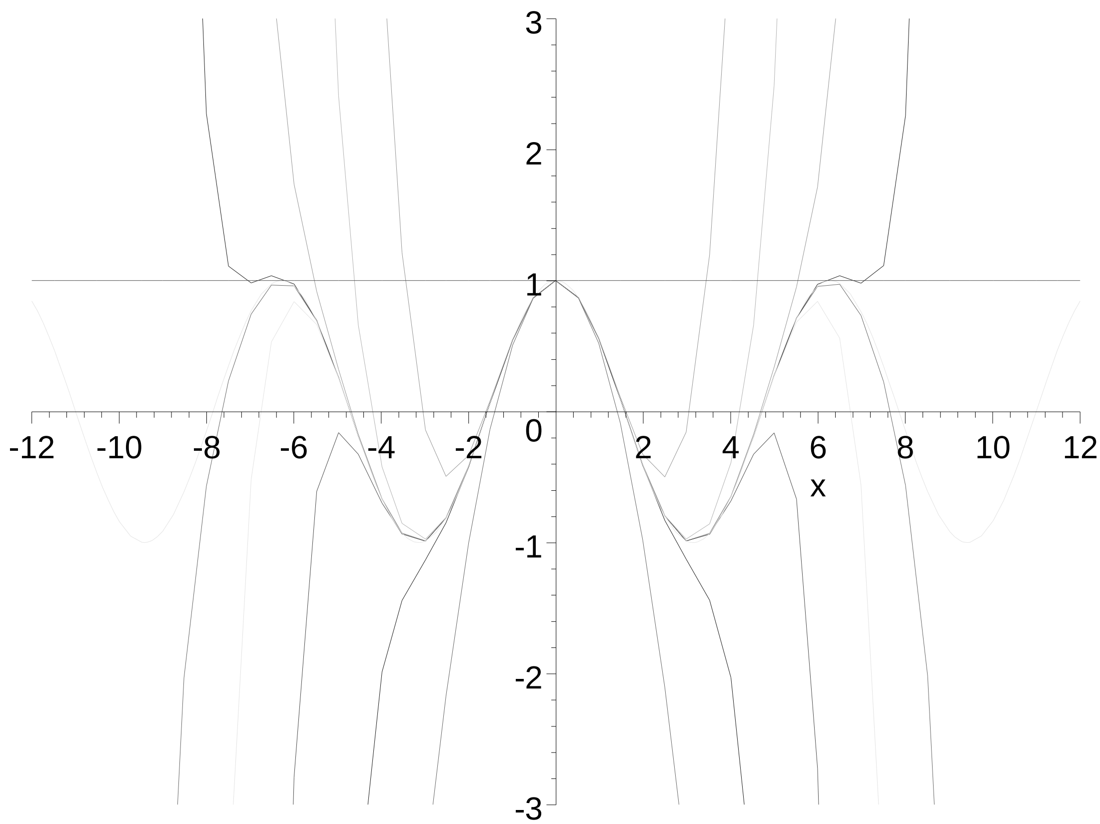
```
> p:=n->convert(taylor(cos(x),x,n),polynom);
```

$$p := n \to \mathrm{convert}(\mathrm{taylor}(\cos(x), x, n), \mathit{polynom})$$

```
> plot({cos(x),seq(p(2*n),n=1..10)},x=-12..12
  ,-3..3);
```



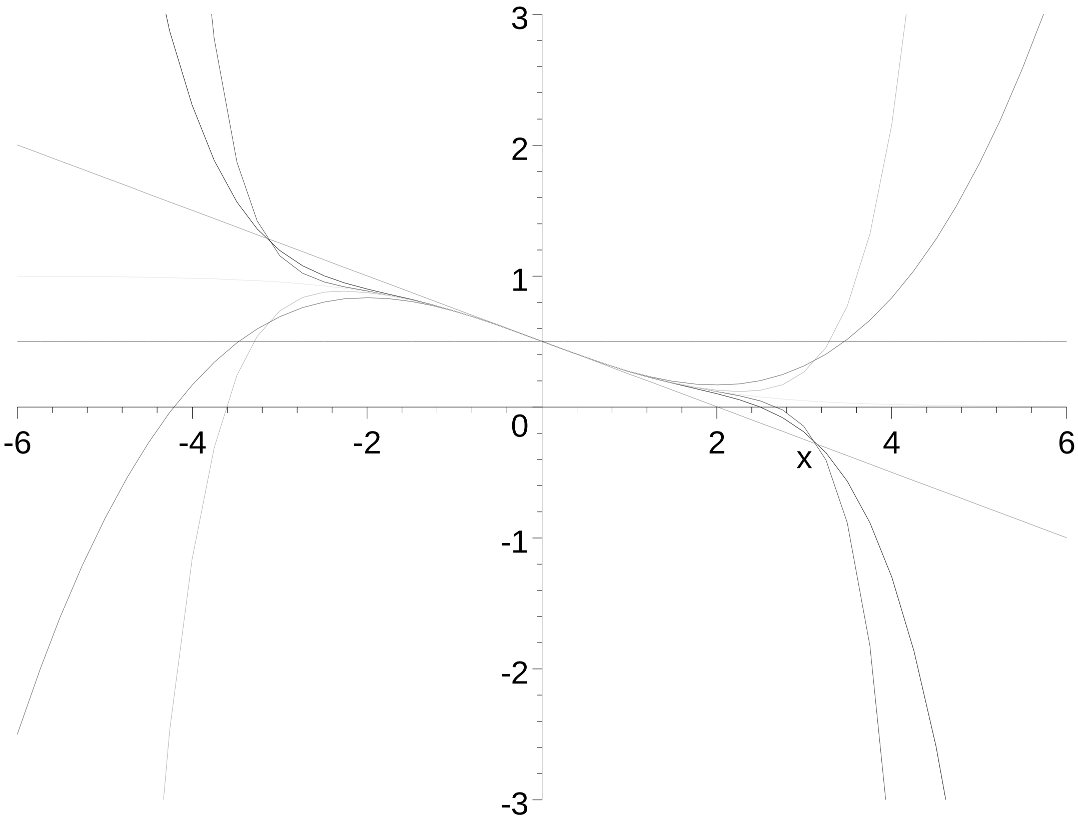

```
> f:=1/(exp(x)+1);
```

$$f := \frac{1}{\mathbf{e}^x + 1}$$

```
> p:=n->convert(taylor(f,x,n),polynom);
```

$$p := n \to \mathrm{convert}(\mathrm{taylor}(f, x, n), \mathit{polynom})$$

```
> plot({f,seq(p(n),n=1..10)},x=-6..6,-3..3);
```



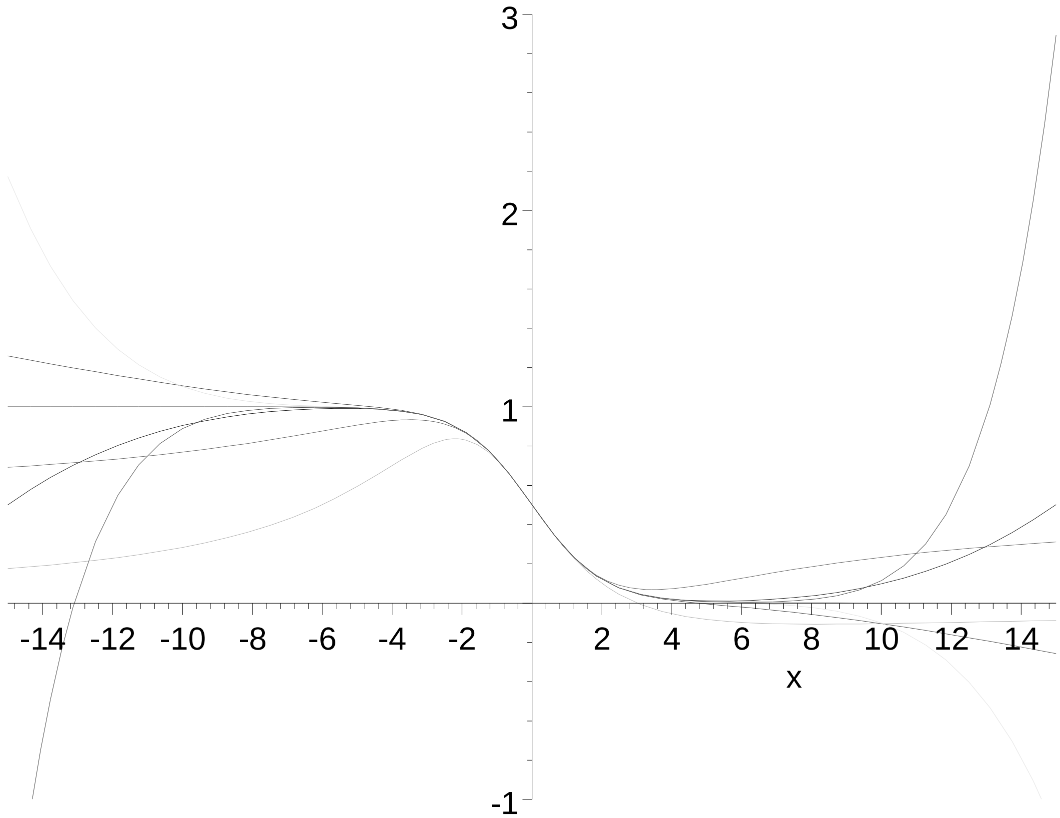

```
> pade:=(m,n)->convert(series(f,x,n+m+1),ratp
  oly,m,n);
```

$$pade := (m, n) \rightarrow \mathrm{convert}(\mathrm{series}(f, x, n+m+1), ratpoly, m, n)$$

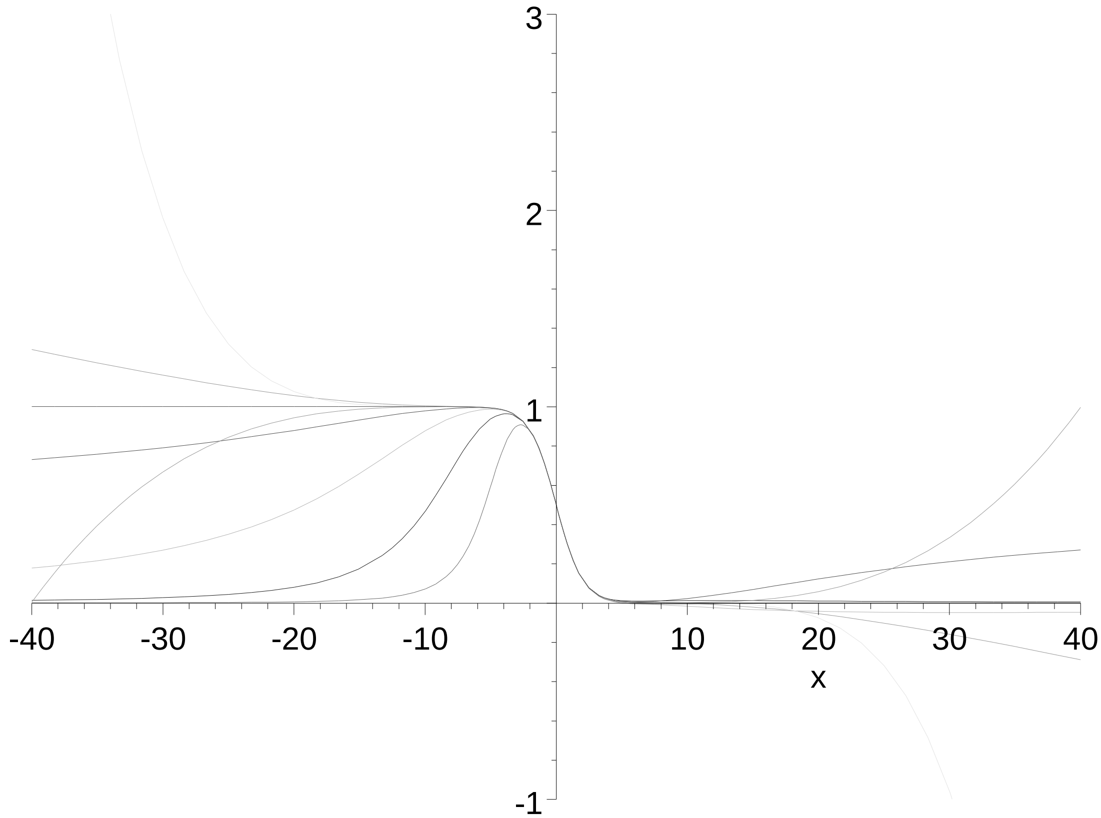
```
> pade(2,2);
```

$$\frac{\frac{1}{2} - \frac{1}{4}x + \frac{1}{24}x^2}{1 + \frac{1}{12}x^2}$$

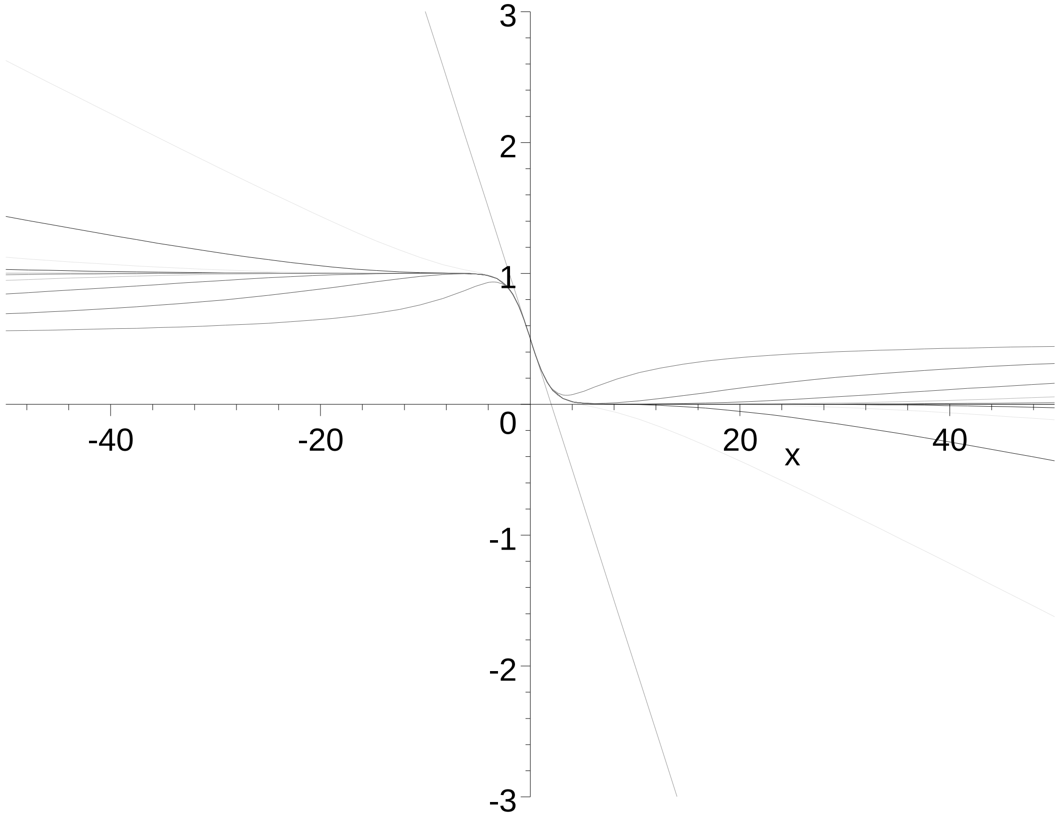
```
> plot({f,seq(pade(m,2),m=1..10)},x=-15..15,-
  1..3);
```




```
> plot({f,seq(pade(m,4),m=1..10)},x=-40..40,-
  1..3);
```




```
> plot({f,seq(pade(m,m),m=1..10)},x=-50..50,-
  3..3);
```




```
> f:=exp(-x^2-x-y^2)*(y+1);
```

$$f := \mathbf{e}^{(-x^2 - x - y^2)} (y + 1)$$

```
> readlib(mtaylor):
> mt:=n->mtaylor(f,[x,y],n);
```

$$mt := n \to \mathrm{mtaylor}(f, [x, y], n)$$

```
> mt(3);
```

$$1 + y - x - x\,y - \frac{1}{2}x^2 - y^2$$

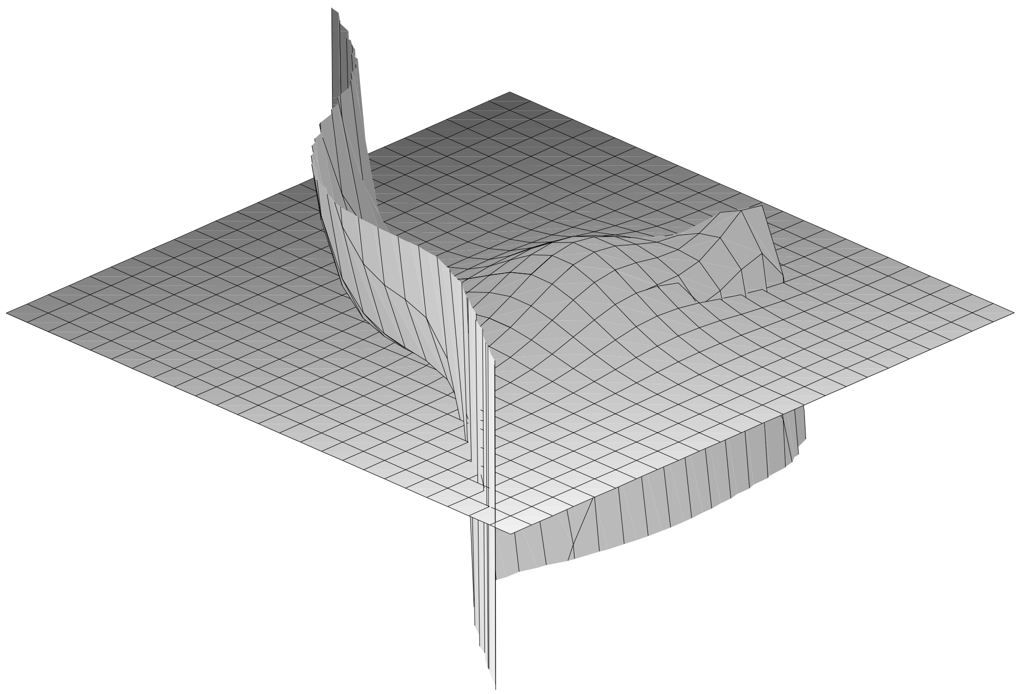
```
> mt(4);
```

$$1+y-x-x\,y-\frac{1}{2}x^2-y^2+\frac{5}{6}x^3-\frac{1}{2}y\,x^2+x\,y^2-y^3$$

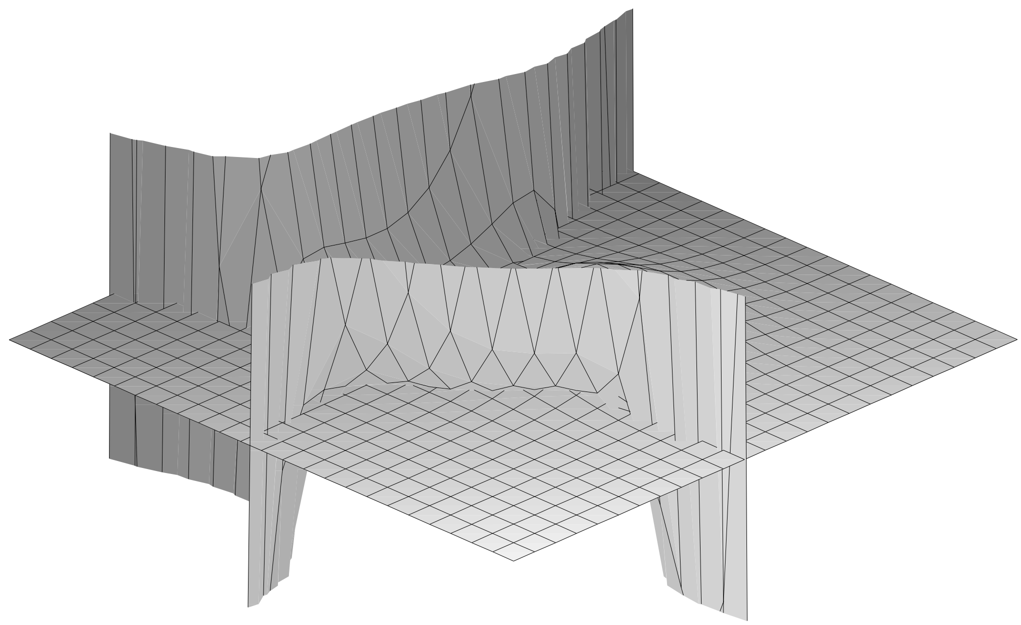
```
> mt(7);
```

$$1-\frac{1}{2}y^5\,x-x+y-y^2-x\,y+\frac{1}{2}y^3\,x^2+\frac{5}{6}x^3-\frac{1}{2}x^2+x\,y^2+\frac{1}{24}x^4-\frac{41}{120}x^5+\frac{31}{720}x^6-\frac{1}{2}y\,x^2-y^3-\frac{1}{2}x\,y^4-\frac{5}{6}x^3\,y^2+\frac{1}{2}x^2\,y^2+\frac{1}{2}y^4-\frac{1}{24}x^4\,y^2-\frac{1}{6}y^6-\frac{1}{4}x^2\,y^4+y^3\,x+\frac{5}{6}y\,x^3+\frac{1}{2}y^5-\frac{5}{6}y^3\,x^3-\frac{41}{120}y\,x^5+\frac{1}{24}y\,x^4$$

```
> plot3d({f,mt(8)},x=-3..3,y=-3..3,view=-4..4
  );
```



```
> plot3d({f,mt(9)},x=-3..3,y=-3..3,view=-4..4
  );
```



```
> f:=sqrt(x)*tan(sqrt(y));
```

$$f := \sqrt{x}\,\tan(\sqrt{y})$$

```
> mt:=n->mtaylor(f,[x=1,y=Pi^2/16],n);
```

$$mt := n \to \mathrm{mtaylor}\left(f, \left[x = 1, y = \frac{1}{16}\pi^2\right], n\right)$$

```
> plot3d({f,mt(5)},x=0..2,y=0..Pi^2/4-0.001,v
  iew=-1..10):
> f:=sqrt(1+sin(x));
```

$$f := \sqrt{1 + \sin(x)}$$

```
> a:=k->int(f*cos(k*x),x=-Pi..Pi)/Pi;
```

$$a := k \to \frac{\int_{-\pi}^{\pi} f \cos(k\,x)\,dx}{\pi}$$

```
> b:=k->int(f*sin(k*x),x=-Pi..Pi)/Pi;
```

$$b := k \to \frac{\int_{-\pi}^{\pi} f \sin(k\,x)\,dx}{\pi}$$

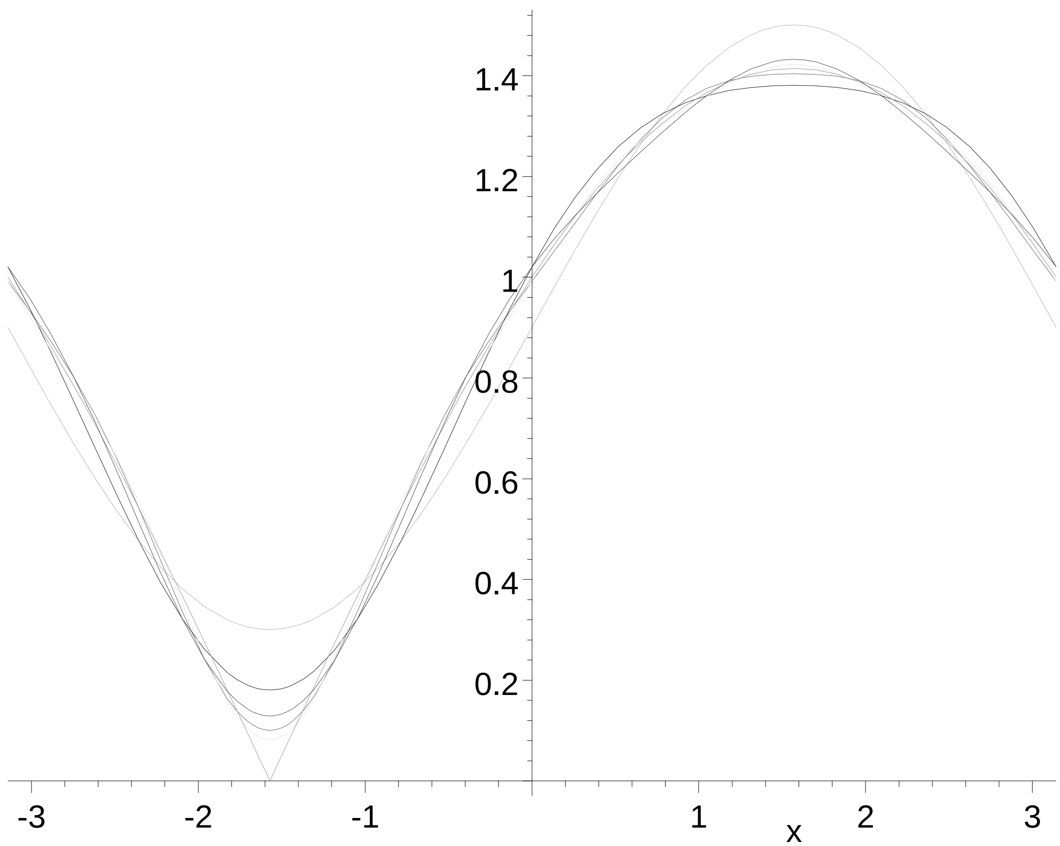
```
> fourier:=n->a(0)/2+sum(a(k)*cos(k*x)+b(k)*sin(k*x),k=1..n);
```

$$fourier := n \to \frac{1}{2}\,\mathrm{a}(0) + \left(\sum_{k=1}^{n} (\mathrm{a}(k)\cos(k\,x) + \mathrm{b}(k)\sin(k\,x)) \right)$$

```
> fourier(5);
```

$$2\,\frac{\sqrt{2}}{\pi} + \frac{4}{3}\,\frac{\sqrt{2}\,\sin(x)}{\pi} + \frac{4}{15}\,\frac{\sqrt{2}\,\cos(2\,x)}{\pi} - \frac{4}{35}\,\frac{\sqrt{2}\,\sin(3\,x)}{\pi} - \frac{4}{63}\,\frac{\sqrt{2}\,\cos(4\,x)}{\pi} + \frac{4}{99}\,\frac{\sqrt{2}\,\sin(5\,x)}{\pi}$$

```
> plot({f,seq(fourier(n),n=1..5)},x=-Pi..Pi);
```




```
> f:=signum(sin(x))*(1-sqrt(abs(sin(x/2))));
```

$$f := \mathrm{signum}(\sin(x))\left(1-\sqrt{\left|\sin\left(\frac{1}{2}x\right)\right|}\right)$$

```
> a:=k->evalf(Int(f*cos(k*x),x=-Pi..Pi)/Pi);
```

$$a := k \rightarrow \mathrm{evalf}\left(\frac{\int_{-\pi}^{\pi} f\cos(k\,x)\,dx}{\pi}\right)$$

```
> b:=k->evalf(Int(f*sin(k*x),x=-Pi..Pi)/Pi);
```

$$b := k \to \mathrm{evalf}\left(\frac{\int_{-\pi}^{\pi} f \sin(k\,x)\,dx}{\pi}\right)$$

```
> fourier:=n->a(0)/2+sum(a(k)*cos(k*x)+b(k)*s
  in(k*x),k=1..n);
```

$$fourier := n \to \frac{1}{2}\,\mathrm{a}(0) + \left(\sum_{k=1}^{n} (\mathrm{a}(k)\cos(k\,x) + \mathrm{b}(k)\sin(k\,x))\right)$$

```
> fourier(3);
```

$$.2546479089\sin(x) + .2263536968\sin(2.\,x) + .1545299276\sin(3.\,x)$$

```
>
> plot({f,seq(fourier(n),n=1..5)},x=-Pi..Pi);
> plot({f,seq(fourier(5*n),n=1..3)},x=-Pi..Pi
  );
> a:=k->int(f*cos(k*x),x=-Pi..Pi)/Pi;
```

$$a := k \to \frac{\int_{-\pi}^{\pi} f \cos(k\,x)\,dx}{\pi}$$

```
> b:=k->int(f*sin(k*x),x=-Pi..Pi)/Pi;
```

$$b := k \to \frac{\int_{-\pi}^{\pi} f \sin(k\,x)\,dx}{\pi}$$

```
> fourier:=n->sum(b(k)*sin(k*x),k=1..n);
```

$$fourier := n \to \sum_{k=1}^{n} \mathrm{b}(k) \sin(k\,x)$$

```
> fourier(3);
Error, (in type/ratpoly) too many levels of recursion
```

```
> b(1);
```

$$\frac{4}{5}\frac{1}{\pi}$$

```
> b(2);
```

$$\frac{32}{45}\frac{1}{\pi}$$

```
> b(3);
```

$$\frac{284}{585}\frac{1}{\pi}$$

```
> b(k);
Error, (in kernels) too many levels of recursion
```

```
>
```