実習15.3

```
> f := x->abs(x)
```

$$f := x \mapsto |x| \tag{1}$$

```
> a := n->(1/Pi)*(int(f(x)*cos(n*x), x=-Pi..Pi))
```

$$a := n \mapsto \frac{\int_{-\pi}^{\pi} f(x)\cos(n\,x)\,dx}{\pi} \tag{2}$$

```
> b := n->(1/Pi)*(int(f(x)*sin(n*x), x=-Pi..Pi))
```

$$b := n \mapsto \frac{\int_{-\pi}^{\pi} f(x)\sin(n\,x)\,dx}{\pi} \tag{3}$$

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

$$s := (x, m) \mapsto \frac{a(0)}{2} + \sum_{n=1}^{m} (a(n)\cos(n\,x) + b(n)\sin(n\,x)) \tag{4}$$

```
> s(x,1)
```

$$\frac{\pi}{2} - \frac{4\cos(x)}{\pi} \tag{5}$$

```
> s(x,5)
```

$$\frac{\pi}{2} - \frac{4\cos(x)}{\pi} - \frac{4\cos(3\,x)}{9\,\pi} - \frac{4\cos(5\,x)}{25\,\pi} \tag{6}$$

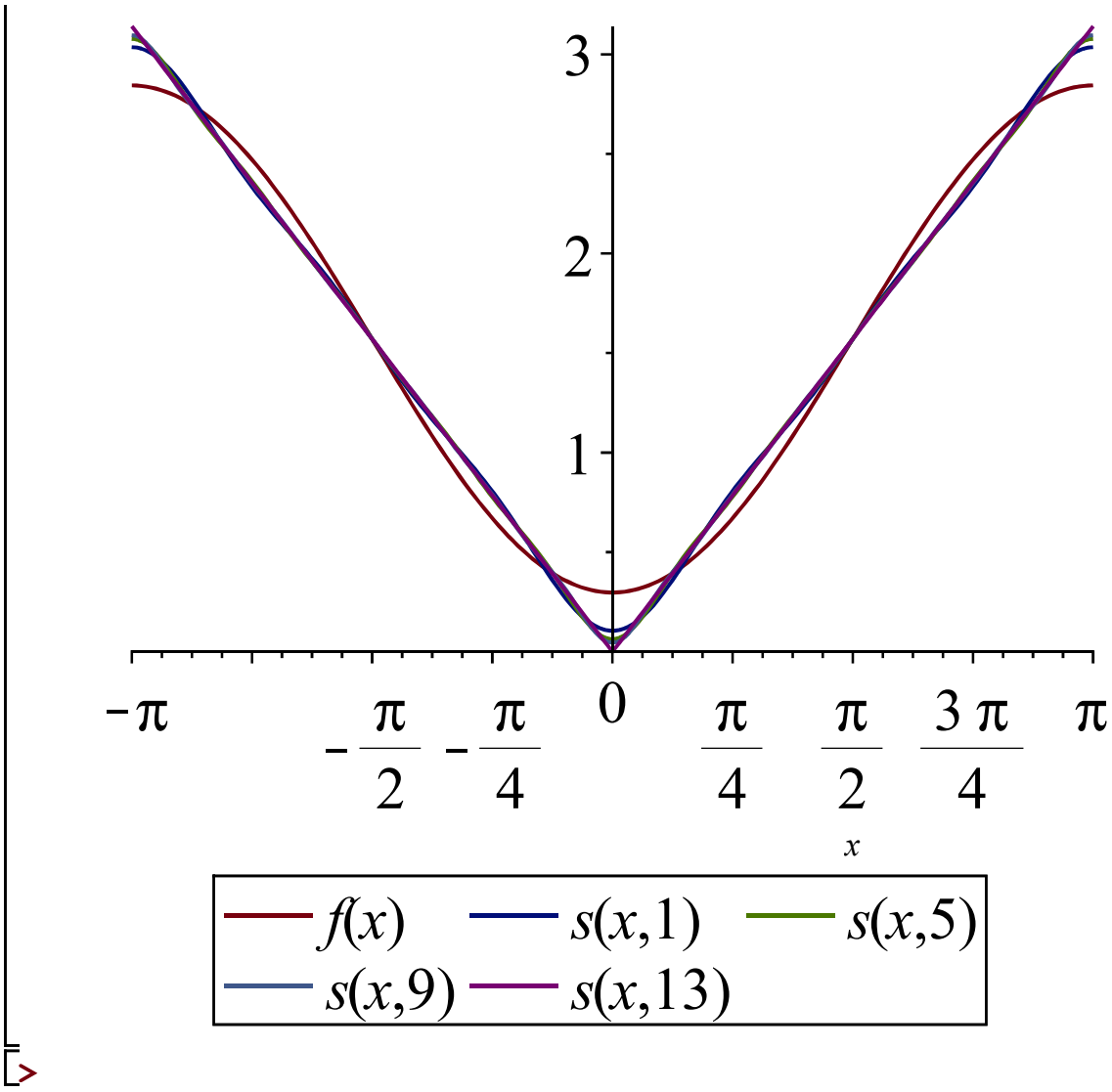
```
> s(x,9)
```

$$\frac{\pi}{2} - \frac{4\cos(x)}{\pi} - \frac{4\cos(3\,x)}{9\,\pi} - \frac{4\cos(5\,x)}{25\,\pi} - \frac{4\cos(7\,x)}{49\,\pi} - \frac{4\cos(9\,x)}{81\,\pi} \tag{7}$$

```
> s(x,13)
```

$$\frac{\pi}{2} - \frac{4\cos(x)}{\pi} - \frac{4\cos(3\,x)}{9\,\pi} - \frac{4\cos(5\,x)}{25\,\pi} - \frac{4\cos(7\,x)}{49\,\pi} - \frac{4\cos(9\,x)}{81\,\pi} - \frac{4\cos(11\,x)}{121\,\pi} - \frac{4\cos(13\,x)}{169\,\pi} \tag{8}$$

```
> plot({f(x), s(x,1), s(x,5), s(x,9), s(x,13)}, x=-Pi..Pi)
```


3
2
1
0
−π
−π/2
−π/4
π/4
π/2
3π/4
π
x
f(x)
s(x,1)
s(x,5)
s(x,9)
s(x,13)