>
実習15.1
> with(plots):
> f := x → x²

$$f := x \mapsto x^2 \tag{1}$$

> a := n → $\left(\dfrac{1}{Pi}\right)$ · (int(f(x)·cos(n·x), x = -Pi..Pi))

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

> b := n → $\left(\dfrac{1}{Pi}\right)$ · (int(f(x)·sin(n·x), x = -Pi..Pi))

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

> s := (x, m) → $\dfrac{a(0)}{2}$ + sum(a(n)·cos(n·x) + b(n)·sin(n·x), n = 1..m)

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

> s(x, 5)

$$\dfrac{\pi^2}{3} - 4\cos(x) + \cos(2\,x) - \dfrac{4\cos(3\,x)}{9} + \dfrac{\cos(4\,x)}{4} - \dfrac{4\cos(5\,x)}{25} \tag{5}$$
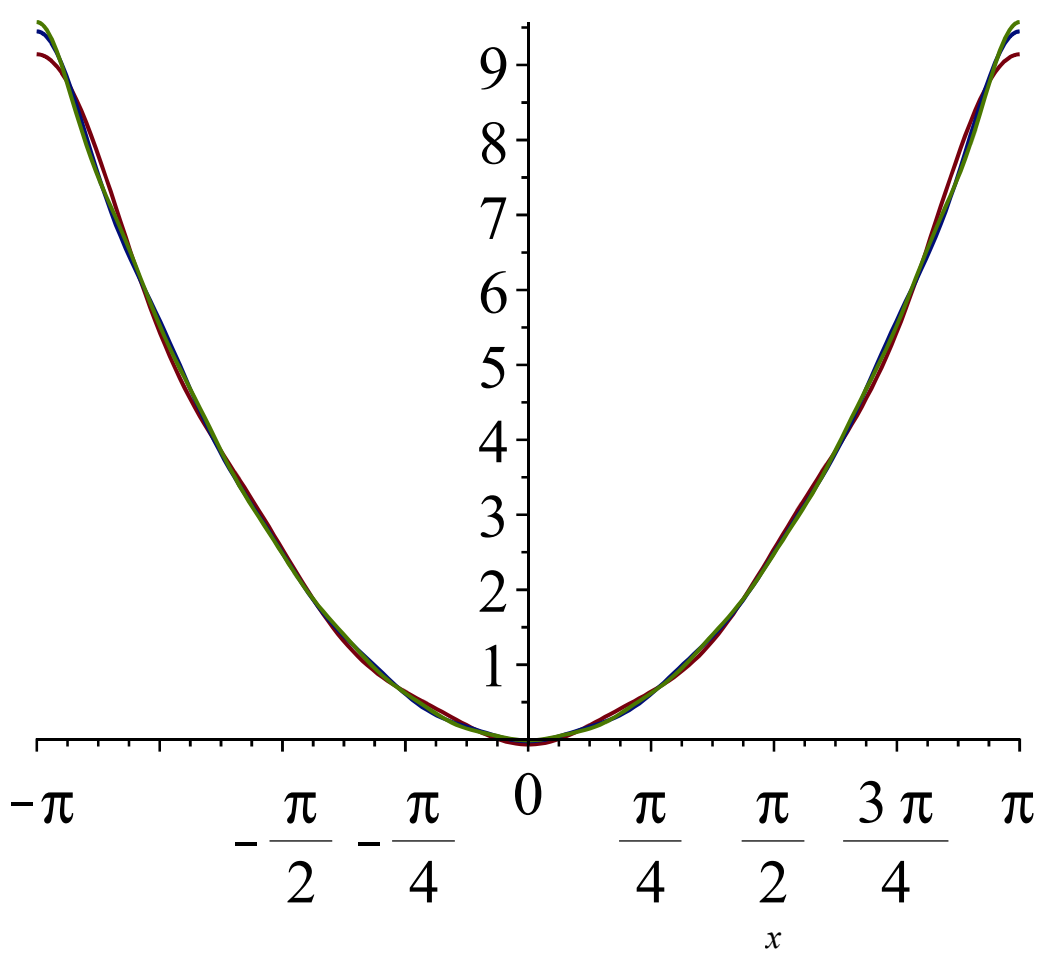
> s(x, 9)

$$\dfrac{\pi^2}{3} - 4\cos(x) + \cos(2\,x) - \dfrac{4\cos(3\,x)}{9} + \dfrac{\cos(4\,x)}{4} - \dfrac{4\cos(5\,x)}{25} + \dfrac{\cos(6\,x)}{9}$$
$$- \dfrac{4\cos(7\,x)}{49} + \dfrac{\cos(8\,x)}{16} - \dfrac{4\cos(9\,x)}{81} \tag{6}$$

> s(x, 13)

$$\dfrac{\pi^2}{3} - 4\cos(x) + \cos(2\,x) - \dfrac{4\cos(3\,x)}{9} + \dfrac{\cos(4\,x)}{4} - \dfrac{4\cos(5\,x)}{25} + \dfrac{\cos(6\,x)}{9}$$
$$- \dfrac{4\cos(7\,x)}{49} + \dfrac{\cos(8\,x)}{16} - \dfrac{4\cos(9\,x)}{81} + \dfrac{\cos(10\,x)}{25} - \dfrac{4\cos(11\,x)}{121} + \dfrac{\cos(12\,x)}{36}$$
$$- \dfrac{4\cos(13\,x)}{169} \tag{7}$$

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

| $-\pi$ | $-\dfrac{\pi}{2}$ | $-\dfrac{\pi}{4}$ | 0 | $\dfrac{\pi}{4}$ | $\dfrac{\pi}{2}$ | $\dfrac{3\pi}{4}$ | π |

x

| $s(x,5)$ | $s(x,9)$ | $s(x,13)$ |