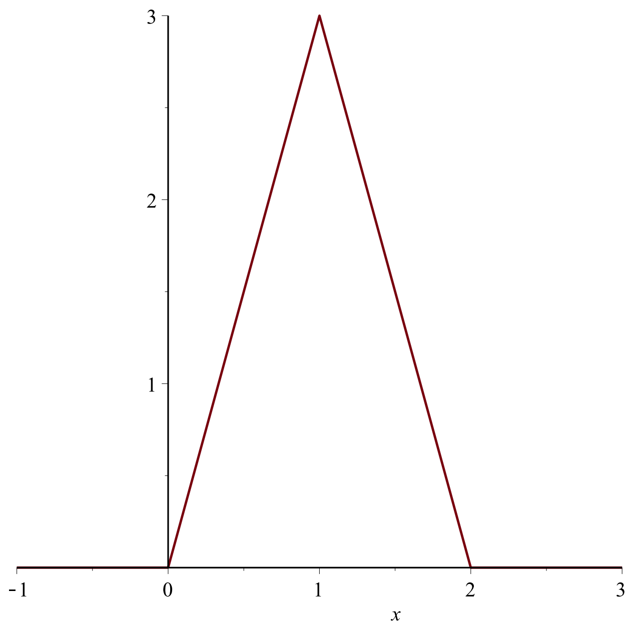
> $f := x \rightarrow \begin{cases} 3 \cdot x & x \geq 0 \textbf{ and } x < 1 \\ -3 \cdot (x-2) & x \geq 1 \textbf{ and } x < 2 \end{cases}$

$$f := x \rightarrow piecewise(0 \leq x \textbf{ and } x < 1, 3\,x, 1 \leq x \textbf{ and } x < 2, -3\,x+6) \tag{1}$$

> $plot(f(x), discont = true, x = -1\,..3)$



>

> $a0 := \dfrac{simplify(int(f(x), x = 0\,..2))}{4}$

$$a0 := \frac{3}{4} \tag{2}$$

> $an := \dfrac{simplify(int(f(x) \cdot \cos(n \cdot \mathrm{Pi} \cdot x), x = 0\,..2))\,\mathrm{assuming}\; n :: posint}{4}$

$$an := \frac{3}{2}\;\frac{-1 + (-1)^{n}}{n^{2}\,\pi^{2}} \tag{3}$$

> $bn := \dfrac{simplify(int(f(x) \cdot \sin(n \cdot \mathrm{Pi} \cdot x), x = 0\,..2))\,\mathrm{assuming}\; n :: posint}{4}$

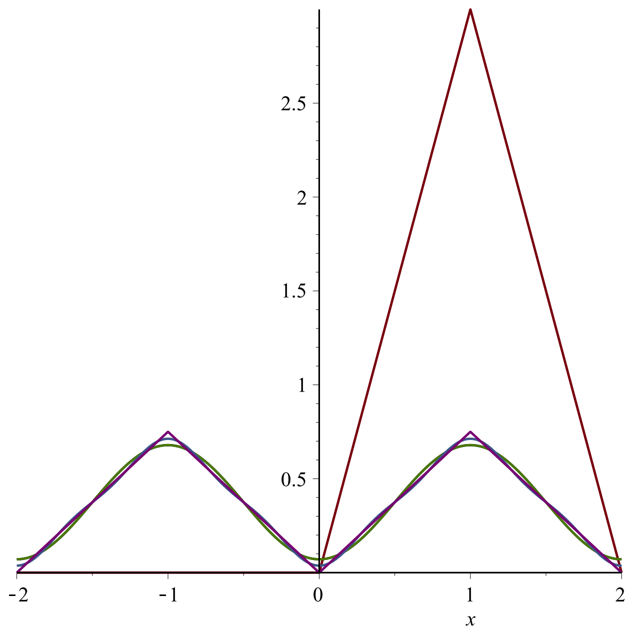
$$bn := 0 \tag{4}$$

> $S := (x, k) \rightarrow \frac{a0}{2} + \sum_{n=1}^{k} (an \cdot \cos(n \cdot \mathrm{Pi} \cdot x) + bn \cdot \sin(n \cdot \mathrm{Pi} \cdot x))$

$$S := (x, k) \rightarrow \frac{1}{2}\, a0 + \sum_{n=1}^{k} \left(an \cos(n\, \pi\, x) + bn \sin(n\, \pi\, x) \right) \tag{5}$$

>

> $plot([f(x), S(x, 1), S(x, 2), S(x, 3), S(x, infinity)], discont = true, x = -2 ..2)$



> $'\frac{1}{4}\int_0^2 f(x)\, \mathrm{d}x' = a0$

$$\frac{1}{4}\int_0^2 f(x)\, \mathrm{d}x = \frac{3}{4} \tag{6}$$

> $'\frac{1}{4}\int_0^2 f(x)\cos(nx)\, \mathrm{d}x' = an$

$$\frac{1}{4}\int_0^2 f(x)\cos(nx)\, \mathrm{d}x = \frac{3}{2}\; \frac{-1 + (-1)^n}{n^2\, \pi^2} \tag{7}$$

> $'\frac{1}{4}\int_0^2 f(x)\sin(nx)\,\mathrm{d}x' = bn$

$$\frac{1}{4}\int_0^2 f(x)\,\sin(nx)\,\mathrm{d}x = 0 \tag{8}$$

> $S := (x,k) \rightarrow \frac{\frac{6}{\mathrm{e}}}{2} + \sum_{n=i}^{k}\left(-\frac{2}{n\,\pi}\cdot\sin(n\cdot\mathrm{Pi}\cdot x)\right)$

$$S := (x,k) \rightarrow \frac{3}{\mathrm{e}} + \sum_{n=i}^{k}\left(-\frac{2\sin(n\,\pi\,x)}{n\,\pi}\right) \tag{9}$$

> $g := (x) \rightarrow \mathit{piecewise}(\mathbf{and}(0 \le x, x < 1), 3\,x, \mathbf{and}(1 \le x, x < 2), -3\,x+6, \mathbf{and}(-2 \le x, x < -1), 3\,x+6, \mathbf{and}(-1 \le x, x < 0), -3\,x)$

$$g := x \rightarrow \mathit{piecewise}(\mathit{and}(0 \le x, x < 1), 3\,x, \mathit{and}(1 \le x, x < 2), -3\,x+6, \mathit{and}(-2 \le x, x < -1), 3\,x+6, \mathit{and}(-1 \le x, x < 0), -3\,x) \tag{10}$$

> $a01 := \frac{\mathit{simplify}(\mathit{int}(g(x), x=-2..2))}{2}$

$$a01 := 3 \tag{11}$$

> $an1 := \frac{\mathit{simplify}(\mathit{int}(g(x)\cdot\cos(n\cdot\mathrm{Pi}\cdot x), x=-2..2))\,\mathrm{assuming}\ n :: \mathit{posint}}{2}$

$$an1 := \frac{6\left(-1+(-1)^n\right)}{n^2\,\pi^2} \tag{12}$$

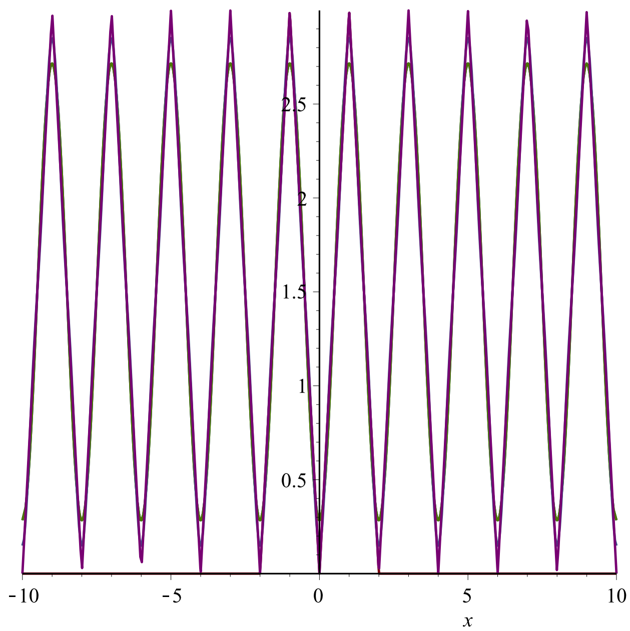
> $bn1 := \frac{\mathit{simplify}(\mathit{int}(g(x)\cdot\sin(n\cdot\mathrm{Pi}\cdot x), x=-2..2))\,\mathrm{assuming}\ n :: \mathit{posint}}{2}$

$$bn1 := 0 \tag{13}$$

> $S1 := (x,k) \rightarrow \frac{a01}{2} + \sum_{n=1}^{k}(an1\cdot\cos(n\cdot\mathrm{Pi}\cdot x) + bn1\cdot\sin(n\cdot\mathrm{Pi}\cdot x))$

$$S1 := (x,k) \rightarrow \frac{1}{2}\,a01 + \sum_{n=1}^{k}\left(an1\cos(n\,\pi\,x) + bn1\sin(n\,\pi\,x)\right) \tag{14}$$

> $\mathit{plot}([\,g(x), S1(x,1), S1(x,2), S1(x,3), S1(x,\mathit{infinity})\,], \mathit{discont}=\mathit{true}, x=-10..10)$



>

> $h := (x) \rightarrow piecewise(\mathbf{and}(-1 \leq x, x < 0), 3\,x, \mathbf{and}(0 \leq x, x < 1), 3\,x, \mathbf{and}(1 \leq x, x < 2), -3\,x + 6, \mathbf{and}(-2 \leq x, x < -1), -3(\,x + 2))$

$$h := x \rightarrow piecewise(and(-1 \leq x, x < 0), 3\,x, and(0 \leq x, x < 1), 3\,x, and(1 \leq x, x < 2), -3\,x + 6, and(-2 \leq x, x < -1), -3\,x - 6) \quad \textbf{(15)}$$

> $a02 := \dfrac{simplify(int(h(x), x = -2..2))}{4}$

$$a02 := 0 \quad \textbf{(16)}$$

> $an2 := \dfrac{simplify\left(int\left(h(x) \cdot \dfrac{\cos(n \cdot \mathrm{Pi} \cdot x)}{2}, x = -2..2\right)\right) \text{assuming } n :: posint}{4}$

$$an2 := 0 \quad \textbf{(17)}$$

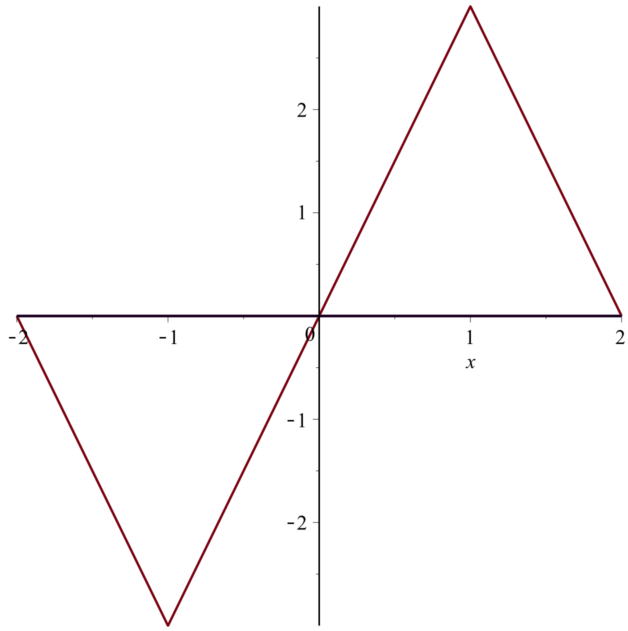
> $bn2 := \dfrac{simplify\left(int\left(h(x) \cdot \dfrac{\sin(n \cdot \mathrm{Pi} \cdot x)}{2}, x = -2..2\right)\right) \text{assuming } n :: posint}{4}$

$$bn2 := 0 \quad \textbf{(18)}$$

> $S2 := (x, k) \rightarrow \dfrac{a02}{2} + \displaystyle\sum_{n=1}^{k} \left(an2 \cdot \dfrac{\cos(n \cdot \mathrm{Pi} \cdot x)}{2} + bn2 \cdot \dfrac{\sin(n \cdot \mathrm{Pi} \cdot x)}{2} \right)$

$$S2 := (x, k) \rightarrow \frac{1}{2}\ a02 + \sum_{n=1}^{k} \left(\frac{1}{2}\ an2 \cos(n\,\pi\,x) + \frac{1}{2}\ bn2 \sin(n\,\pi\,x) \right) \tag{19}$$

> plot([h(x), S2(x, 1), S2(x, 2), S2(x, 3), S2(x, infinity)], discont = true, x = -2 ..2)



>

> $'\frac{1}{4}\int_0^2 g(x)\ dx' = a01$

$$\frac{1}{4}\int_0^2 g(x)\ dx = \frac{3}{2} \tag{20}$$

> $'\frac{1}{4}\int_{-2}^2 g(x)\cos(nx)\ dx' = an1$

$$\frac{1}{4}\int_{-2}^2 g(x)\ \cos(nx)\ dx = \frac{3}{4}\ \frac{-1 + (-1)^n}{n^2\,\pi^2} \tag{21}$$

> $'\frac{1}{4}\int_{-2}^{2} g(x)\sin(nx)\,\mathrm{d}x' = bn1$

$$\frac{1}{4}\int_{-2}^{2} g(x)\,\sin(nx)\,\mathrm{d}x = 0 \tag{22}$$

> $S1 := (x,k) \to \frac{\frac{3}{2}}{2} + \sum_{n=i}^{k}\left(\frac{3\left(-1+(-1)^{n}\right)}{n^{2}\pi^{2}}\cdot\cos(n\cdot\mathrm{Pi}\cdot x)\right)$

$$S1 := (x,k) \to \frac{3}{4} + \sum_{n=i}^{k}\frac{\left(-3+3\,(-1)^{n}\right)\cos(n\,\pi\,x)}{n^{2}\,\pi^{2}} \tag{23}$$

> $'\frac{1}{4}\int_{0}^{2} h(x)\,\mathrm{d}x' = a02$

$$\frac{1}{4}\int_{0}^{2} h(x)\,\mathrm{d}x = 0 \tag{24}$$

> $'\frac{1}{4}\int_{-2}^{2} h(x)\cos(nx)\,\mathrm{d}x' = an2$

$$\frac{1}{4}\int_{-2}^{2} h(x)\,\cos(nx)\,\mathrm{d}x = 0 \tag{25}$$

> $'\frac{1}{4}\int_{-2}^{2} h(x)\sin(nx)\,\mathrm{d}x' = bn2$

$$\frac{1}{4}\int_{-2}^{2} h(x)\,\sin(nx)\,\mathrm{d}x = 0 \tag{26}$$

> $S2 := (x,k) \to \frac{\frac{3}{2}}{2} + \sum_{n=i}^{k}\left(\frac{3\left(-1+(-1)^{n}\right)}{n^{2}\pi^{2}}\cdot\cos(n\cdot\mathrm{Pi}\cdot x)\right)$

$$S2 := (x,k) \to \frac{3}{4} + \sum_{n=i}^{k}\frac{\left(-3+3\,(-1)^{n}\right)\cos(n\,\pi\,x)}{n^{2}\,\pi^{2}} \tag{27}$$

>

>

>