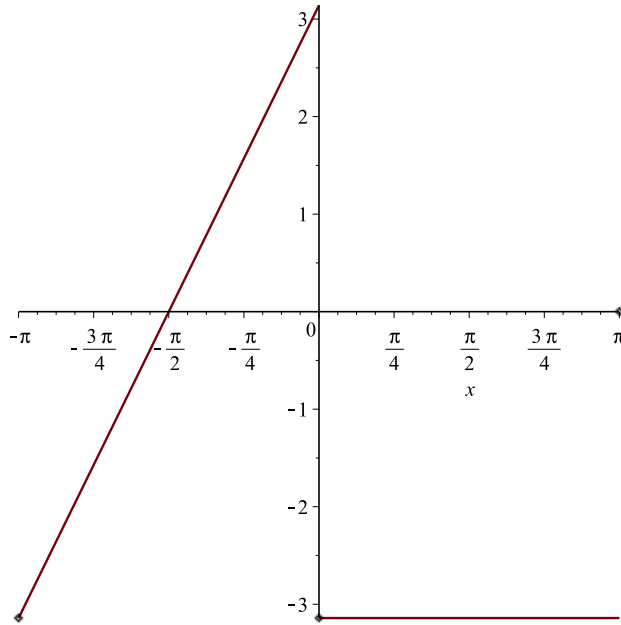


$$\begin{aligned}
 &> f := x \rightarrow \begin{cases} \text{Pi} + 2 \cdot x & x \geq -\text{Pi} \text{ and } x < 0 \\ -\text{Pi} & x \geq 0 \text{ and } x < \text{Pi} \end{cases} \\
 &\quad f := x \rightarrow \text{piecewise}(-\pi \leq x \text{ and } x < 0, \pi + 2x, 0 \leq x \text{ and } x < \pi, -\pi)
 \end{aligned} \tag{1}$$

> plot(f(x), x = -Pi .. Pi, discontinuous = true)



$$\begin{aligned}
 &> a0 := \frac{\text{simplify}(\text{int}(f(x), x = -\text{Pi} .. \text{Pi}))}{\text{Pi}} \\
 &\quad a0 := -\pi
 \end{aligned} \tag{2}$$

$$\begin{aligned}
 &> an := \frac{\text{int}(f(x) \cdot \cos(n \cdot x), x = -\text{Pi} .. \text{Pi}) \text{ assuming } n :: \text{posint}}{\text{Pi}} \\
 &\quad an := -\frac{2((-1)^n - 1)}{n^2 \pi}
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 &> bn := \frac{\text{simplify}(\text{int}(f(x) \cdot \sin(n \cdot x), x = -\text{Pi} .. \text{Pi}) \text{ assuming } n :: \text{posint}}{\text{Pi}} \\
 &\quad bn := -\frac{2}{n}
 \end{aligned} \tag{4}$$

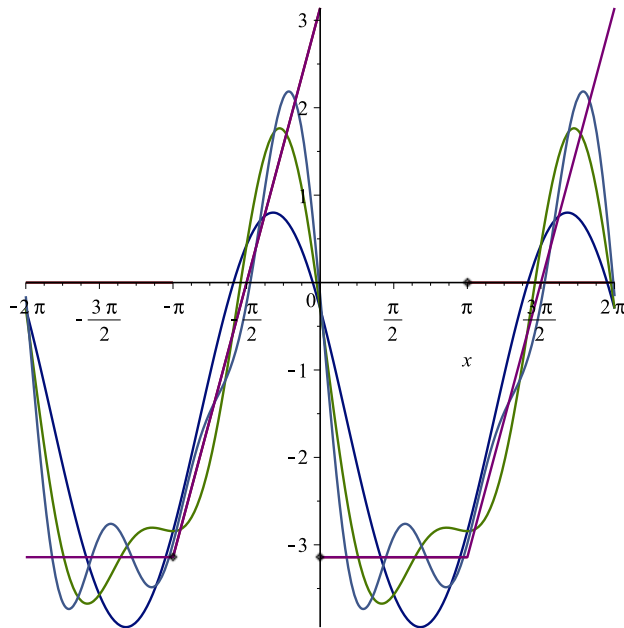
$$> S := (x, k) \rightarrow \frac{a_0}{2} + \sum_{n=1}^k (a_n \cdot \cos(n \cdot x) + b_n \cdot \sin(n \cdot x))$$

$$S := (x, k) \rightarrow \frac{1}{2} a_0 + \sum_{n=1}^k (a_n \cos(n x) + b_n \sin(n x))$$

(5)

>

> plot([f(x), S(x, 1), S(x, 2), S(x, 3), S(x, infinity)], discontinuous = true)



$$> \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) dx$$

$-\pi$

(6)

$$> \left[\frac{1}{\pi} \int_{-\pi}^{\pi} f(x) \cos(nx) dx \right] = a_n$$

$$\frac{\int_{-\pi}^{\pi} f(x) \cos(nx) dx}{\pi} = 0$$

(7)

$$\begin{aligned}
 & \left. \begin{aligned} & \textcolor{red}{>} \text{ , } \frac{1}{\text{Pi}} \int_{-\text{Pi}}^{\text{Pi}} f(x) \sin(nx) \, dx = bn \\ & \frac{\int_{-\pi}^{\pi} f(x) \sin(nx) \, dx}{\pi} = \frac{(-1)^n - 1}{n \pi} \end{aligned} \right\} \quad (8)
 \end{aligned}$$

$$\begin{aligned}
 & \left. \begin{aligned} & \textcolor{red}{>} S := (x, k) \rightarrow \frac{a0}{2} + \sum_{n=i}^k (an \cdot \cos(n \cdot \text{Pi} \cdot x) + bn \cdot \sin(n \cdot \text{Pi} \cdot x)) \\ & S := (x, k) \rightarrow \frac{1}{2} a0 + \sum_{n=i}^k (an \cos(n \pi x) + bn \sin(n \pi x)) \end{aligned} \right\} \quad (9)
 \end{aligned}$$

$$\begin{aligned}
 & \left. \begin{aligned} & \textcolor{red}{>} S := (x, k) \rightarrow -\frac{\pi}{2} + \sum_{n=i}^k \left(\frac{(-1)^n - 1}{n \pi} \cdot \sin(n \cdot \text{Pi} \cdot x) \right) \\ & S := (x, k) \rightarrow -\frac{1}{2} \pi + \sum_{n=i}^k \frac{((-1)^n - 1) \sin(n \pi x)}{n \pi} \end{aligned} \right\} \quad (10)
 \end{aligned}$$