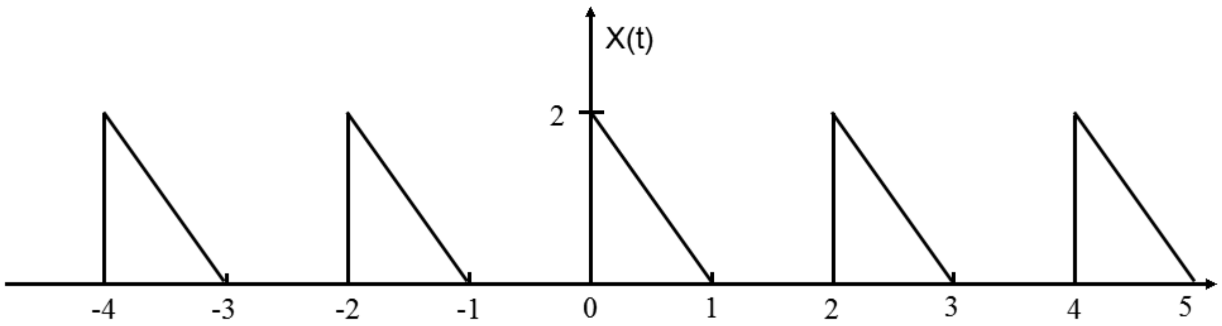
$$x(t) = \begin{cases} -2t+2 & , 0 \le t \le 1 \\ 0 & , 1 < t < 2 \end{cases}$$



$T = 2$, $\omega_0 = \frac{2\pi}{T} = \pi$

$$\boldsymbol{x(t) = a_0 + \sum_{n=1}^{\infty} \left(a_n \cos n\omega_0 t + b_n \sin n\omega_0 t\right)}$$

$$\begin{aligned} a_0 &= \frac{1}{T}\int_T x(t)dt \\ &= \frac{1}{2}\int_0^2 x(t)dt \\ &= \frac{1}{2}\left[\int_0^1 (-2t + t)dt + \int_1^2 0 \times dt\right] \\ &= \frac{1}{2}\left[2t - t^2\Big|_0^1\right] \\ &= \frac{1}{2} \end{aligned}$$

$$\begin{aligned} a_n &= \frac{2}{T}\int_T x(t)\cos(n\omega_0 t)dt \\ &= \frac{2}{2}\int_0^2 x(t)\cos(n\pi t)dt \\ &= \int_0^1 (-2t + 2) \times \cos(n\pi t)dt + \int_1^2 0 \times \cos(n\pi t)dt \\ &= \frac{1}{n\pi}\left[(-2t + 2) \times \sin(n\pi t)\Big|_0^1 - \frac{2}{n\pi}\cos(n\pi t)\Big|_0^1\right] \\ &= \frac{1}{n\pi}\left(-\frac{2}{n\pi}(\cos(n\pi) - 1)\right) \\ &= \frac{2}{(n\pi)^2}\left(1 + (-1)^{n+1}\right) \\ &= \begin{cases} \frac{4}{(n\pi)^2} & , n \text{ is odd} \\ 0 & , n \text{ is even} \end{cases} \end{aligned}$$

$$\begin{aligned} b_n &= \frac{2}{T}\int_T x(t)\sin(n\omega_0 t)dt \\ &= \frac{2}{2}\int_0^2 x(t)\sin(n\pi t)dt \\ &= \int_0^1 (-2t + 2) \times \sin(n\pi t)dt + \int_1^2 0 \times \sin(n\pi t)dt \\ &= \frac{-1}{n\pi}\left[(-2t + 2) \times \cos(n\pi t)\Big|_0^1 + \frac{2}{n\pi}\sin(n\pi t)\Big|_0^1\right] \\ &= \frac{-1}{n\pi}\left(-2 + \frac{2}{n\pi}\sin(n\pi)\right) \\ &= \frac{2}{n\pi} \end{aligned}$$