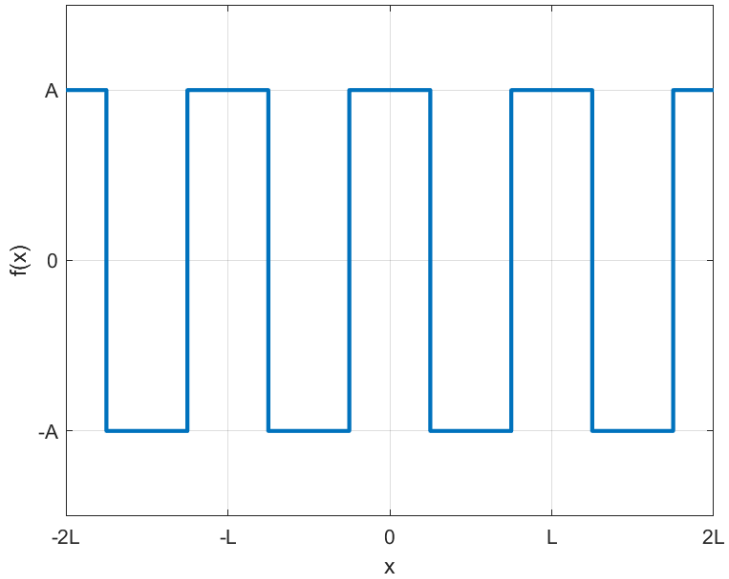
Homework 4

Problem 1

Consider a function defined by:

$$f(x) = \{A \quad for\ 0 \leq x < \tfrac{L}{4}\ ;\ \ -A \quad for\ \tfrac{L}{4} \leq x < \tfrac{3L}{4}\ ;\ \ A \quad for\ \tfrac{3L}{4} \leq x < L\}$$

(This is similar to, but not the same as, the example Morin works on page 14 of Chapter 3.)



Find the values of all the Fourier series coefficients, i.e. a_0, a_n and b_n. In some cases you can provide an argument for why a certain coefficient (or set of coefficients) must equal zero instead of having to do an actual integral, but the integral will turn out that way too, if you do it.

Problem 2

Consider a "half sawtooth" function, periodic with period L and defined by:

$$f(x) = \{Ax \quad for\ 0 \leq x < \tfrac{L}{2}\ ;\ \ 0 \quad for\ \tfrac{L}{2} \leq x < L\ \}$$

Two periods of this function are shown to the right. Calculate all of the Fourier series coefficients, i.e. a_0, a_n and b_n.