Week 11 Worksheet: Fourier series

To receive credit, hand in as many solved practice problems as time permits. Try unfinished problems at home. Solution of this worksheet will be made available on the website.

1. **(Demonstration)** Find the Fourier series of the square function

$$f(x) = \begin{cases} -1, & -\pi \le x \le 0; \\ 1, & 0 < x \le \pi. \end{cases}$$

2. **(Practice)** Find the Fourier series of

$$f(x) = \begin{cases} 0, & -\pi \le x \le 0; \\ 1, & 0 < x \le \pi. \end{cases}$$

   (Hint: Use the result from Q1 to find the Fourier series for $g(x) = f(x) - 1/2$.)

3. **(Practice)** Find the Fourier series of the sawtooth function

$$f(x) = x, \quad -\pi < x \le \pi.$$

4. **(Practice)** Find the Fourier series of the function

$$f(x) = x^2, \quad -\pi < x \le \pi.$$