REAL ANALYSIS
MATH 205B/H140B, HW#9

Chapter 15, exercises 1, 2, 3, 4, 5, 6, 7, and the following problems:

Problem 1.

An odd square wave is a 2π-periodic function $f : \mathbb{R} \to \mathbb{R}$ given by

$$f(x) = \begin{cases} 0, & \text{if } \frac{x}{\pi} \in \mathbb{Z}; \\ 1, & \text{if } x \in (2\pi k, 2\pi k + \pi) \text{ for some } k \in \mathbb{Z}; \\ -1, & \text{if } x \in (2\pi k - \pi, 2\pi k) \text{ for some } k \in \mathbb{Z}. \end{cases}$$

Find the Fourier series associated to the square wave on $[-\pi, \pi]$.

Problem 2.

Find the Fourier series of the function $f : [-\pi, \pi] \to \mathbb{R}$, $f(x) = \sin^2(x)$.

Problem 3.

Find the Fourier series of the function $f : [-\pi, \pi] \to \mathbb{R}$, $f(x) = x^2$.