

# Worksheet 27

Sections 306 and 310  
MATH 54

Nov 29, 2018

**Exercise 1.** Are the following functions even, odd, or neither?

(a)  $f(x) = \sin^2(x)$

(b)  $f(x) = \sin(x + 1)$

(c)  $f(x) = x^{1/5} \cos(x^2)$

(d) Why can it be helpful to know when a function is even or odd? Name a specific example in which using this can ease computation.

**Exercise 2.** Compute the fourier series for the given function on the specified interval. On your own time, use a computer to plot a few partial sums of the Fourier series.

$$f(x) = x, -\pi < x < \pi$$

**Exercise 3.** The norm of a function,  $\|f\| = \sqrt{\langle f, f \rangle}$  is like the length of a vector in  $\mathbb{R}^n$ . In particular, show that this norm satisfies the following properties associated with length:

1.  $\|f\| \geq 0$ , and  $\|f\| = 0$  if and only if  $f = 0$ .
2.  $\|cf\| = |c|\|f\|$ , where  $c$  is any real number.
3.  $\|f + g\| \leq \|f\| + \|g\|$