MATH 480 A: FOURIER ANALYSIS AND ITS APPLICATIONS

ASSIGNMENT 2

Due Monday April 13:

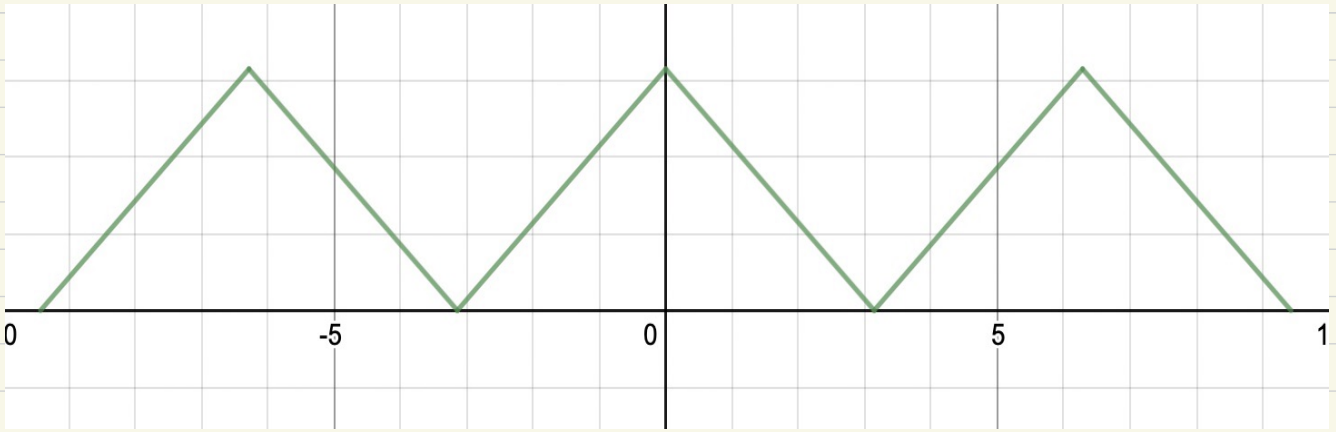
- Read Chapter 2: §2.1 & §2.4.
- Optional reading Chapter 3: §3.1 & §3.2.
- **R** problems for class discussion: §1.3 page 17 #5; §2.1 page 31, # 4, 5, 9.
- Watch the movie **Solving the heat equation** available at movies
- Use the Desmos graphing calculator to complete the investigation described in the attached pages.

Due Wednesday April 15:

- **TI** problems: §1.3 page 17 #4, 6, 7; §2.1 page 31, # 3, 7, 10. (To be submitted on gradescope by 8pm). USE THE HINTS!!! When deriving a formula, you may use any formula earlier on the list, whether or not you have derived the earlier formula. You should need to compute integrals for only one or two of the **TI** and **R**.
- **E** problems:§1.3 page 17 # 3

The Fourier series for

$$f(\theta) = \begin{cases} \pi - \theta & 0 \le \theta \le \pi \\ \pi + \theta & -\pi \le \theta \le 0 \end{cases}$$



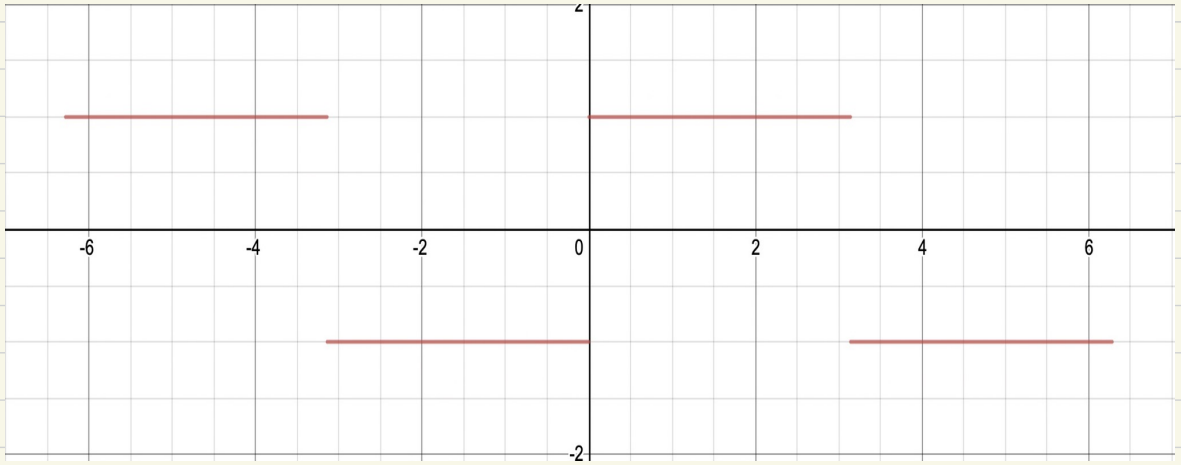
is

$$\pi/2 + 4/\pi \sum_{k=0}^{\infty} \frac{\cos(2k+1)\theta}{(2k+1)^2}$$

Let $S_m = \frac{\pi}{2} + 4/\pi \sum_{k=0}^{m} \frac{\cos(2k+1)\theta}{(2k+1)^2}$. Using Desmos graph S_1, S_2, S_3 and S_4. What do you observe?

The Fourier series for

$$f(\theta) = \begin{cases} -1 & -\pi < \theta < 0 \\ 1 & 0 < \theta < \pi \end{cases}$$



is

$$\frac{4}{\pi} \sum_{k=0}^{\infty} \frac{\sin(2k+1)\theta}{2k+1}$$

Let $S_m = \frac{4}{\pi} \sum_{k=0}^{m} \frac{\sin(2k+1)\theta}{(2k+1)}$. Using Desmos graph

S_1, S_2, S_3 and S_4. What do you observe?