HW 2 • FALL 2019 • PROF. BOYLAND

1. On $[0, \pi]$ define
$$f(t) = \frac{\pi - t}{2}$$
and extend it to an *even* function on $[-\pi, \pi]$. Sketch the graph of f and compute its Fourier series.

2. Compute the Fourier series of the function $\chi_{\pi/4}$ defined on $[-2\pi, 2\pi]$ (notice the interval is *not* $[-\pi, \pi]$) by
$$\chi_{\pi/4}(t) = \begin{cases} 1 & \text{if } |t| < \pi/4 \\ 0 & \text{if } |t| \geq \pi/4 \end{cases}$$

3. Let $f(t) = t$ on $[-\pi, \pi]$.
   (a) Compute the Fourier series of f.
   (b) Compute the Fourier series of f in orthonormal form.
   (c) Give and explicit sum formula for the mean square error of order N, $\|E_N\|^2$.