Math 2080: Differential Equations Worksheet 6.2: Computation of Fourier series

NAME:

Consider the function defined by $f(x) = \begin{cases} 0, & -\pi \le x < 0 \\ x, & 0 \le x < \pi \end{cases}$ and extended to be 2π -periodic.

(a) Sketch f(x) on at least the interval $[-3\pi, 3\pi]$, and find its Fourier coefficients (i.e., a_0, a_n , and b_n).

(b) Write f(x) as a Fourier series: $f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos nx + b_n \sin nx$ (i.e., plug the coefficients back in).

(c) Explicitly write out the first few terms (n = 0, 1, ..., 7) of the Fourier series of f(x).