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

NAME:

Consider the function defined by $f(x) = \begin{cases} 0, & -\pi \leq x < 0 \\ x, & 0 \leq x < \pi \end{cases}$ 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: $f(x) = \dfrac{a_0}{2} + \displaystyle\sum_{n=1}^{\infty} a_n \cos nx + b_n \sin nx$ (i.e., plug the coefficients back in).

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