Math 2080: Differential Equations
Worksheet 6.4: Complex Fourier series

NAME:

Consider the function defined by $f(x) = x$ for $-\pi \leq x \leq \pi$ and extended to be 2π-periodic.

1. Sketch $f(x)$ and find its complex Fourier coefficients (i.e., c_0 and c_n).

2. Write $f(x)$ as a *complex Fourier series*: $f(x) = \sum_{n=-\infty}^{\infty} c_n e^{inx} = c_0 + \sum_{n=1}^{\infty}(c_n e^{inx} + c_{-n}e^{-inx})$.

3. Find the real Fourier coefficients. Recall that $a_n = c_n + c_{-n}$ and $b_n = i(c_n - c_{-n})$.