MthSc 208: Differential Equations (Spring 2011)
In-class Worksheet 6a: Fourier Series

NAME:

Consider the square wave defined by $f(x) = \begin{cases} 1, & 0 \le x < \pi \\ -1, & -\pi \le x < 0 \end{cases}$ and extended to be 2π-periodic.

1. Sketch $f(x)$ and find its Fourier coefficients (i.e., a_0, a_n, and b_n).

2. Write $f(x)$ as a *Fourier series*: $f(x) = \dfrac{a_0}{2} + \displaystyle\sum_{n=1}^{\infty} a_n \cos nx + b_n \sin nx.$

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