Name:

1. Find the general solution to the following differential equation.

$$\mathbf{x}'(t) = \begin{pmatrix} -1 & 1 \\ -1 & -3 \end{pmatrix} \mathbf{x}(t)$$

2. For $x \in (-\pi, \pi]$, define $f(x)$ by

$$f(x) = \begin{cases} 1 & -\pi < x \leq 0 \\ 1 - x & 0 < x \leq \pi \end{cases}$$

and let $f(x) = f(x + 2\pi)$ for all $x \in \mathbb{R}$. Find the Fourier series for $f(x)$.