Math 2080: Differential Equations
Worksheet 6.5: Applications of Fourier series

NAME:

1. Compute the real Fourier series of the function $f(x) = x^2$ defined on $-\pi < x \leq \pi$ and extended to be periodic of period 2π, and then use *Parseval's identity* to compute $\displaystyle\sum_{n=1}^{\infty} \frac{1}{n^4}$.

2. Find the general solution to the ODE $y'' + y = f(t)$, where $f(t)$ is the square wave of period 2π defined by $f(t) = \begin{cases} 1, & 0 \leq t < \pi \\ -1, & -\pi \leq t < 0 \end{cases}$.