Homework 1

Math 4306 - Partial Differential Equations

Dr. Mewomo

Do all the problems. Type each one up using latex and submit on or before the due date.

1. David L. Powers Sixth Edition - Section 1.1 Exercise 1 b, d
2. David L. Powers Sixth Edition - Section 1.2 Exercise 1 b
3. David L. Powers Sixth Edition - Section 1.2 Exercise 5 (Only determine if the functions are odd, even or neither. You don't need to sketch.
4. David L. Powers Sixth Edition - Section 1.2 Exercise 15
5. Find the Fourier series of the function $f(x) = \frac{|x|}{x}$ over $(-\pi, \pi)$, where $f(x) = f(x + 2\pi)$.
6. Find the Fourier series of the function $f(x) = x^2$ over $(-\pi, \pi)$. Hence or ortherwise, show that
$$\frac{\pi^2}{12} = \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^2}.$$
7. Find the Fourier-cosine series of the function $f(x) = \sin x$ over $(0, \pi)$. Hence or ortherwise, show that
$$\sum_{n=1}^{\infty} \frac{1}{(2n-1)(2n+1)} = \frac{1}{2}.$$