

Math 309 Quiz 4

November 19, 2015

Problem 1. Consider the function

$$f(x) = \begin{cases} 0 & -2 \leq x < 0 \\ 1 & 0 \leq x < 2 \end{cases}, \quad f(x+4) = f(x) \text{ for all } x.$$

- (a) Find the Fourier series of $f(x)$
- (b) For which values of x does the Fourier series converge to $f(x)$?
- (c) What does the Fourier series converge to at the remaining points?

Problem 2. Consider the function

$$f(x) = \frac{1}{2} + \sin(3x) + \cos(4x) + 3 \cos(7x).$$

Calculate the value of

$$\frac{1}{\pi} \int_{-\pi}^{\pi} f(x)^2 dx.$$

[Hint: you can use Parseval's identity (though it's not necessary)]