

MA 520 Spring 2024 (Aaron N. K. Yip)

Homework 4

Due: Thursday, Jan. 25th, in class

Folland: Fourier Analysis and Its Applications

Section 2.2 (p.37): #3, 4, 5;

Section 2.3 (p.42): #1, 2, 3, 4, 5, 6.

Additional Problem

Consider the  $2\pi$ -periodic function given by  $f(x) = (x^2 - \pi^2)^2$  for  $-\pi < x < \pi$ . (This is the fifth example in the note of WEEK 2.)

1. Derive – show your computation – the Fourier series expansion of  $f(x)$ . (The answer is already given in the note.)
2. Set  $x = 0, \frac{\pi}{2}$  and  $\pi$  in the Fourier expansion of  $f(x)$  and write down the identities you obtain.