

Homework #4

Due in class on Wednesday, February 25th, 2015

Reading: Griffiths Chap. 2, sections 2.1-2.3.1 (skip 2.3.2 for now), and 2.4.

Read p70 of Griffiths to remind yourself of the definition of Dirac's delta function.

1. Griffiths Problem 2.24, p77.

We have started to study Fourier analysis. This will be an immensely useful tool throughout the course and so we would like to develop it a bit further. A classic theorem in Fourier analysis is

Plancherel's Theorem:

$$\boxed{f(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} F(k)e^{ikx} dk \iff F(k) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} f(x)e^{-ikx} dx.} \quad (1)$$

2. Griffiths Problem 2.20, p66 guides you through a proof of this result.

3. Griffiths Problem 2.26, p77.

4. Griffiths Problem 2.4, p38.

5. Griffiths Problem 2.5, p38.

6. Griffiths Problem 2.7, p39.