

# Physics 211: Modern Physics

Problem Set 6: Due 19 Nov 2024

## 1. Fourier Series

Consider a piecewise function given by

$$f(x) = \begin{cases} x & \text{if } x \leq 1 \\ 2 - x & \text{if } 1 < x \leq 3 \\ x - 4 & \text{if } 3 \leq x \leq 5 \end{cases}$$

- Sketch the function in a Pluto notebook. You will have to define a function  $f(x)$  that takes as input values of  $x$  between 0 and 5. Label your axes!
- Now compute the Fourier series for this function. I recommend using paper to start, but then typeset the resulting series in a markdown cell in your Pluto notebook. (Hint: Will your Fourier series include both sine and cosine terms? Think about the symmetry of the function!)
- Define a function and use a slider or a some interactive element to plot the original function and the Fourier series on the same plot.

## 2. De Broglie

Taylor, problem 6.2

## 3. Electron vs Blue light

Taylor, problem 6.4

## 4. Electron vs Neutron

Taylor, problem 6.6

## 5. Double Slit Electron

Taylor, problem 6.14