IMPORTANT DATES:

1. There will be a proficiency exam in the last 25 minutes of class on **Friday, April 10th**.
2. The homework problems from this handout are due **Monday, April 13th**.

Section 5.7: Convolutions - key concepts were covered on the previous handout

homework: pg. 241, # 27, 29.

Section 12.1: Computation of Fourier Series - The goal in this section is, given an appropriate function $f(x)$, to find coefficients a_n, b_n such that we can express $f(x)$ as a **Fourier series**

$$f(x) = \frac{a_0}{2} + \sum_{n=1}^{\infty} \left(a_n \cos(\frac{n\pi x}{L}) + b_n \sin(\frac{n\pi x}{L}) \right).$$

In this section, we discuss how to find the coefficients a_n, b_n and for which functions this works, namely **periodic** functions that are **piecewise continuous**. We also define **even** and **odd** functions and discuss how their Fourier series are special.

homework: pg. 604-5, # 4, 10, 16.

Section 12.3: Fourier Cosine and Sine Series - As noted above, even and odd functions have special Fourier series. Key points:

1. the Fourier series for an even function has only cosine terms, not sine terms
2. the Fourier series for an odd function has only sine terms, not cosine terms
3. a function that is neither even nor odd, defined on an interval, can be extended to be periodic and either even or odd outside of that interval, and the corresponding Fourier series representation depends on which extension is used

homework: pg. 617, # 3, 7, 11, 12, 13, 22, 29.

Section 13.1: Derivation of the Heat Equation - The heat equation is a partial differential equation that can be used to model a lot of things. Partial differential equations track how quantities change in both time and space. In particular, the heat equation describes the evolution of the temperature in an object. Temperature can be different at different positions on the object (*space*) and at each position, it can change over *time*. We will discuss

1. the derivation of the heat equation in a long, thin rod
2. initial conditions and boundary conditions for the heat equation
3. the maximum principle: the maximum and minimum temperatures within an object occur on the boundaries of an object
4. the linearity of the heat equation

homework: next week