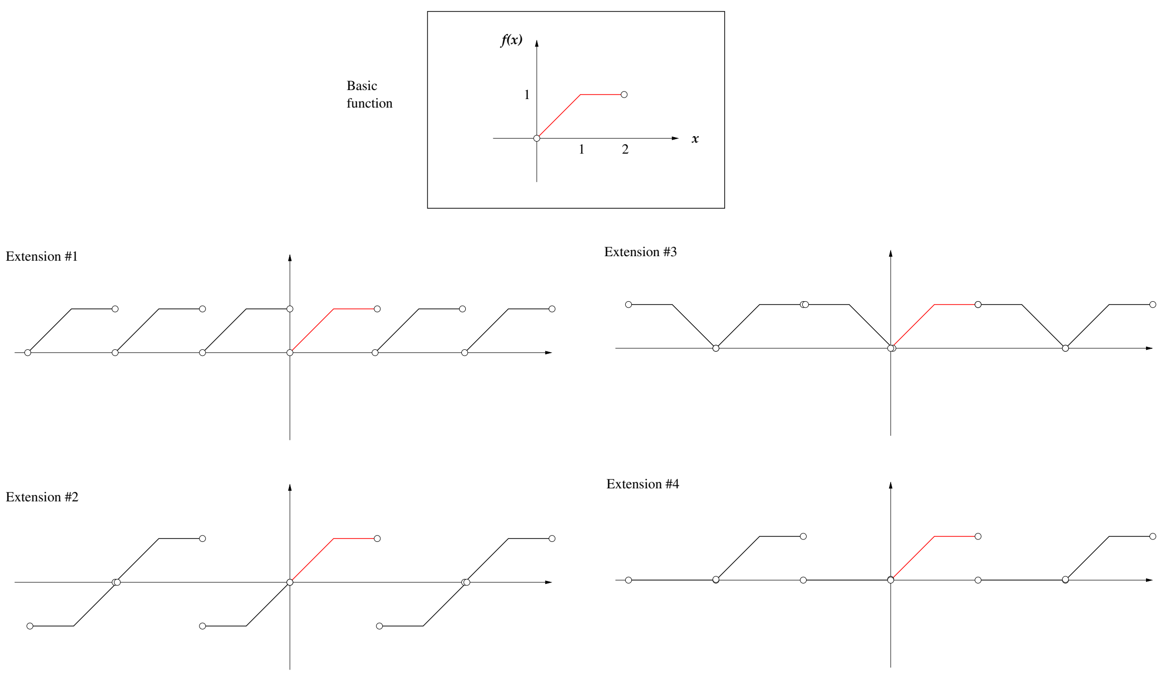
Math 319 - Differential Equations II
Pre-Reading Assignment # 5
due 10am Thu Sep 25th, via email

Reading This page.

In section 10.3 of your text, we find Fourier series for functions defined on a finite domain by repeating the domain. These repetitions are an *extension* of the original function. There are other ways we could choose to extend the original function. Suppose we consider the function

$$f(x) = \begin{cases} 2x & \text{for } 0 < x \leq 1, \\ 1 & \text{for } 1 \leq x < 2. \end{cases} \tag{1}$$

A plot of this function is the "Basic function" shown in red in Figure . Given this function, we can then choose to extend it in a number of different ways. Four are shown in Figure . Extension #1 is the extension method we have been using so far - simply repeating the function horizontally. The next two extensions are obtained through reflections of the basic function. The last extension is obtained by adding zero to the function so that it is defined on a symmetric interval, and then repeating that function horizontally as in Extension #1.



Questions Answer the question below to the best of your ability. There are *no calculations* required!!!

1. Consider the four extensions shown in Figure . Suppose you were to derive the Fourier series for each of the extensions shown. Which extension would give rise to a
   (a) Fourier sine series? Why?
   (b) Fourier cosine series? Why?
   (c) Fourier series with sine and cosine terms? Why?