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18.085 Computational Science and Engineering I
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18.085: Matlab Homework #6

Fourier Series (Gibbs phenomenon).

Create a figure like Fig. 4.3 showing the partial sums of the Fourier series for a square wave:

$$f(x) = \begin{cases} 1 & x \geq 0 \\ -1 & x < 0 \end{cases}$$

- Measure the “overshoot.” How is this number related to the Fourier series for the delta function? (Look at Fig. 4.2).
- Find a relation between the WIDTH of the overshoot and the NUMBER of terms in the partial sum for the square wave.

Now do the same calculation for the hat function:

$$f(x) = \begin{cases} 1 - x/\pi & x \geq 0 \\ 1 + x/\pi & x < 0 \end{cases}$$

Is there an overshoot in this case? Why or why not? (Again make a figure like Fig. 4.3).