Math 584, Problem set 3 due February 28, 2017
Dr. Epstein

Reading: Read sections 4.1–4.2.5, the introduction to section 4.3, section 4.4 through 4.4.2, and 4.5. You are free to use maple (or Mathematica, MATLAB etc.) to help you to do these problems. Try running MATLAB worksheets 3, 4 and 5. Do the exercises at the end of the worksheets.

Here are some "standard" problems from the textbook. You should do them, but do not have to hand them in.

1. 4.1.1, 4.1.5, 4.1.6
2. 4.2.6, 4.2.19

The solutions to the following problems should be written up and handed in:

1. Be sure to read section 3.5.2 before doing these problems: 3.5.11, and 3.5.14. You may assume the conclusion of 3.5.8.
2. Compute the Fourier transforms of the following functions:
    (a)
    $$f(x) = (1 - x)\chi_{[0,1]}(x).$$
    (b)
    $$f(x) = (1 - x^2)\chi_{[-1,1]}(x).$$
3. Do problems 4.2.3, 4.2.4, 4.2.5 from the text.
4. Do problems 4.2.12 from the text.
5. Do problem 4.2.20 from the text.
6. Do problem 4.5.2 from the text.
7. Do problem 4.5.11 from the text.

The following problems are optional, as we will not cover the material on weak derivatives, in class, at the present time. We may come back to it later.

1. Do problems 4.3.1, and 4.3.4 from the text.
2. Compute the weak first derivatives of $\sqrt{x}\chi_{[0,\infty)}(x)$ and $(1-x^2)\chi_{[-1,1]}(x)$, and the weak second derivative of $|x|^{\frac{3}{2}}$.