Math 563, Fall 2016
Assignment 3, due Wednesday, September 28

Hand in the following exercises. Note that there is a difference between an "exercise" and a "problem" in the text, below we refer to the former.

1. Stein-Shakarchi, Exercise #1, Chapter 2.
2. Stein-Shakarchi, Exercise #6, Chapter 2.
3. Stein-Shakarchi, Exercise #10, Chapter 2.
   You may want to recall Theorem 8.3 in Rudin here.
4. Stein-Shakarchi, Exercise #11, Chapter 2.

Reading: Stein and Shakarchi, Chapter 2.
On your own:

1. Prove the following refinement of the Tchebychev inequality in Exercise #9, Chapter 2 of Stein-Shakarchi:

   Suppose f is a measurable function such that $|f(x)|^p$ is integrable. For $\alpha > 0$, define $E_\alpha = \{x : |f(x)| > \alpha\}$. Prove that

$$m(E_\alpha) \leq \frac{1}{\alpha^p} \int_{E_\alpha} |f(x)|^p \, dx.$$