Homework 6, due Oct 31

- p 3 and 10 in p 162-64 of Stein's book on Fourier analysis.
- Let A be a real symmetric $n \times n$ matrix whose eigenvalues are all positive. Prove the integral of the function f on $\mathbb{R}^n$ is given by

$$\int f(x)\ \mathrm{d}^n x = 1, \quad f(x) = \frac{1}{(2\pi)^{n/2}\sqrt{\det A}} e^{-(x,Ax)/2}. \tag{0.1}$$

  Find the Fourier transform of the function f.
- Find the Fourier transform of the function $f(x) = e^{-|x|}$ with $x \in \mathbb{R}$.
- Find the Fourier transform of the function on $\mathbb{R}^3$:

$$f(x) = \frac{1}{m^2 + |x|^2}, \quad x \in \mathbb{R}^3 \tag{0.2}$$