Homework 7

Problem: exercise 8.13a from Dodelson & Schmidt (4 points). One popular way to characterize power on a particular scale is to compute the expected RMS overdensity in a sphere of radius R,

$$\sigma_R^2 \equiv \left\langle \delta_R^2(x) \right\rangle . \tag{1}$$

Here

$$\delta_R(\vec{x}) \equiv \int d^3x' \delta(\vec{x}') W_R(\vec{x} - \vec{x}'), \tag{2}$$

where $W_R(x)$ is the *tophat* window function, equal to 1 for $x < R$ and 0 otherwise; the angular brackets denote average over all space.

i) By Fourier transforming, express σ_R in terms of an integral over the power spectrum.