COSMOLOGY

Homework 3

1 Consider a flat universe with only normal non-relativistic matter $\Omega_m = 1$. The power spectrum of perturbations is a pure power law $P(k) = Ak$. Normalization of the spectrum is chosen such that $\sigma_8 = 1$. Find $\sigma = (\Delta M/M)$ for objects of different mass at three redshifts: 0, 3, 5. Use the top-hat filter. Plot the three curves $\sigma(M, z)$ for mass in the range $(10^{10} - 10^{15})M_\odot$ in the same figure.

2 Using the provided table of the power spectrum, find and plot

(a) the correlation function of dark matter $\xi(R)$ for $R = 1 - 200$Mpc/h.

(b) the rms of density fluctuations $\sigma = (\Delta M/M)$ as the function of M for scales $M = (10^{10} - 10^{16})M_\odot$. Use the top-hat filter.