Exercise2 - Theory

- Exercise: Let's assume the same $\sigma_8(z=0)$ for 3 different models with 1) $\Omega_m = 1.0$, 2) $\Omega_m = 0.3, \Omega_\Lambda = 0$ and 3) $\Omega_m = 0.3$ and $\Omega_\Lambda = 0.7$. Which model will have more massive clusters at z=2, why? Let's now assume the same $\sigma_8(z=20)$ for all the models. Which one will have more massive clusters at $z=2$? and at $z=0$?

Exercise - Simulations

- Create one of the following cosmological initial conditions.
  - 128^3 particles with $\Omega_m = 1.0$
  - 128^3 particles with $\Omega_m = 0.3$, $\Omega_\Lambda = 0.7$
  - 128^3 particles with $\Omega_m = 0.7$, $\Omega_\Lambda = 0.3$
- All simulations have $\sigma_8 = 0.9$, $n = 1$, $h = 0.72$, $L_{box} = 90 Mpc/h$, $\Omega_b = 0.044$.
- Don't forget to run LINGERS as first step with the right cosmological model.
- Create the IC file both with and without gas.

Steps to take to creat ICs:

- Download the grafic package
- Install grafic (we do not need to install ic2gif, don't worry if you cannot compile it).
- Pick up one of the models and create the correct lingers.dat file (the transfer function).
  To do that you need to run LINGER.
  - remove the file lingerg.dat if present.
  - For Tcmb, Y-He, N-nu(massive), use 2.726 0.24 0.
  - For kmin (1/Mpc), kmax (1/Mpc), nk, zend use 1.e-4 50 100 0
  - Choose: isentropic (adiabatic) fluctuations

  To know how to run GRAFIC, read the README file in the grafic directory (or come to me).
- Use VEL2GADGET to convert the IC in GADGET.
  - compile vel2gadget
  - run it, answer to the simple questions it asks (hint: final ref. factor =1)
- Use GAD2TIPSY to convert the gadget-IC into a tipsy file
- Visualize the IC using TIPSY

1 How to use tipsy

- openb filename
- loads 1
- xall

if everything is correct you should see you particles plotted on the screen.
Gray = dark matter
Red = gas particles