Write a code to compute the relation between redshift and the following cosmological quantities: comoving distance D_C, luminosity distance D_L, angular diameter distance D_A, and the total comoving volume of a sphere out to that redshift V_C. The code should work for any combination of cosmological parameters that result in a flat universe. The parameters are: the hubble constant h, the matter density parameter Ω_m, the dark energy density parameter Ω_Λ, and the dark energy equation of state parameter w.

Run your code for the following four cosmological models:
1. Flat universe, no dark energy: $h=1$, $\Omega_m=1.00$, $\Omega_\Lambda=0.00$
2. Flat universe, "cosmological constant" dark energy: $h=1$, $\Omega_m=0.25$, $\Omega_\Lambda=0.75$, $w=-1$
3. Flat universe, dark energy with a high w: $h=1$, $\Omega_m=0.25$, $\Omega_\Lambda=0.75$, $w=-0.8$
4. Flat universe, dark energy with a low w: $h=1$, $\Omega_m=0.25$, $\Omega_\Lambda=0.75$, $w=-1.2$

Make the following four plots, <u>showing all four of the above models in each plot</u>:

a) comoving distance D_C vs. redshift z

b) luminosity distance D_L vs. redshift z

c) angular diameter distance D_A vs. redshift z

d) comoving volume of a sphere V_C vs. redshift z

In all plots make the redshift (x-axis) run from 0 to 3. In the three distance plots show the distances in units of h^{-1}Gpc. In the last plot, show the volume in h^{-3}Gpc^3.

Hand in a printout of your code in addition to the four plots.