Sample Exam type questions
to be addressed in Discussion Sections

Equations that may or may not be useful:

$F = ma; E = mc^2; T = T_o(1+z); D = v/H_0; F = L/(4\pi D^2)$

$H_0 = \dot{\mathrm{R}}_0/R;\ \dot{\mathrm{R}}_0^2/R_0^2 + kc^2/R_0^2 = G8\pi\rho_0/3$

$H_0^2 + kc^2/R_0^2 = G8\pi\rho_0/3$

$\dot{\mathrm{R}}_0^2/R_0^2 + kc^2/R_0^2 = G8\pi\rho_0/3 + \Lambda/3$

$\rho_c = 3H_0^2/G8\pi;\ d\tau^2 = (cdt)^2 - R^2dr^2/(1-kr^2)$

1. The study of shapes is also called _____.
2. Name 3 main types of galaxies _____, _____, _____
3. Draw the "Hubble tuning" fork and give the direction that Hubble thought these galaxies evolved in.
4. Which type of galaxy has no current star formation, *has a* disk, and relatively little gas and dust. _____
5. Discuss why the Hubble Tuning Fork Model doesn't work.
6. Be able to recognize a few famous galaxies.. Andromeda, (M31) the LMC, and the SMC.
7. How are M87, 3C273, and "West Side Story" all related? Answer, they all have _____
8. QSOs are thought to be powered by massive black _____.
9. Why do we think QOSs are powered they way they are rather than via nuclear burning? Include the concepts of flux, luminosity, redshift, time variability and causal contact.
10. Item QSOs are called QSO, because: (a) they are quasi- subluminoius obsjects; (b) they are queer, starnge obsjecst; (c) they are quais-substantive objects; (d) they look like stars in celestial phtographs
11. The diameter of the emitting region of a QSO which is as luminious as 10-100 galaxies put together, is how much compared to the distance to the closest star to the sun? (a) 10-100 times larger, (b) 100-1000 times smaller, (c) 1 million times larger (d) 1 million times smaller.
12. what astronomical object looks some what similar to a nuclear bomb blast? _____

13. The spin axis of a massive black hole in QSOs and radio galaxies defines the direction of the _____.

14. Give a scenario of galaxy formation and tie in the different galaxy types and how this fits into what we see as we go back in redshift versus nearby systems, QSO, AGNs etc.

15. Halton Arp and the Burbidges argue that (a) Globular clusters are not what they seem to be; (b) redshifts don't tell us the distance to QSOs; (c) redshifts don't tell us the age of the Universe; (d) we've got the distance of Cepheids all wrong.

16. If we just look at the 21 cm line in the interstellar medium (ISM), what H will we be missing in the ISM (a) molecular and ionized forms b) the H with 3 protons, (b) the H with 2 protons, (c) the H with 5 protons; (d) H atoms with electron orbits parallel to our line of sight so we miss them.

17. I emphasized we should write M/L scaled with "h" since this matters for external galaxies. This doesn't matter for the model for our own galaxy because?: (a) our galaxy is contracting and the Hubble constant is for an expanding universe; (b) we measure distances within our galaxy using parallax or Cepheids, not redshift; (c) Planck's constant is not well (to 10%) measured; (d)the dust in the galaxy messes up our redshift measurements.

18. High M/L values compared to the local value argues for the *existence* of _____? And what are some reasonable values in solar units for the local (within about 100 pc of the solar system) neighborhood _____. and for external spiral galaxies.

19. If given fixed set of measurements, if we then (arbitrarily) increase to value of the Hubble constant by factor of two, what is the change to $Omega_{matter}$. (a) it doubles, (b) it is 4 times large, (c) it is 16 times smaller, (d) is remains the same.

20. Why did the plots of the age versus Ω_m shown in class cross at 1? How does the figure show that we can have increase the age even more for a given Ω_m when Λ is not equal to 0? Because: (a) as we move to higher values of Ω_m, t/H_0^{-1} raises; (b) a we move to higher values of Ω_m, t/H_0^{-1} stays constant; (c) as we move to lower values of Ω_m, t/H_0^{-1} raises; (d) as we move to lower values of Ω_m, t/H_0^{-1} drops;

21. Why does using the double lobed radio source diameter as "standard rulers" for the angle versus distance measurement of the geometry of the universe fail? (a) because they are all not aligned in the plane of the sky (b) because the size of the rulers evolves with time (c) because we don't use standard rulers to make this measurement (d) because we can only use "normal" (that the human eye can see , called the visible " band") light to make this measurements and the radio lobes are invisible in the visible part of the spectrum

22. Given an ore sample that is 1/8 uranium and and 7/8 lead, how many half lives old of Uranium would this sample be? (a) 1, (b)2, (c) 3 (d)4 (e) 5?