ASTRO 130, Homework on chapter 25, Due Nov 13
Name: _____ Date:

1. The spectrum of the quasar PKS 2000-330 contains the UV Lyman $L_\alpha$ line ($\lambda_0$ =121.567 nm) which has been shifted into the visible region of the spectrum by a cosmological redshift of z = 3.773. What is the redshift, $\Delta\lambda_0$, of this radiation in nanometers?
   A) 45.85 nm
   B) 458.5 nm
   C) 701.5 nm
   D) 635 nm

2. A quasar is now thought to be
   A) the central core of an active galaxy.
   B) a very active, very distant star.
   C) a long-lived supernova explosion.
   D) a nearby star, ejected with great violence out of a galaxy.

3. Observationally, the biggest difference between quasars and other active galaxies such as Seyferts and radio galaxies appears to be that
   A) Seyferts and radio galaxies have bright nuclei, but do not have ejected jets of material from their nuclei.
   B) quasars appear to be located inside elliptical galaxies, whereas Seyferts and radio galaxies are all inside spirals.
   C) Seyferts and radio galaxies do not have the bright, starlike nuclei of quasars.
   D) Seyferts and radio galaxies are less powerful than quasars.

4. To what does the phrase "superluminal motion" refer?
   A) the motion of relativistic electrons in magnetic fields
   B) the apparent motion of jets of gas at speeds faster than light
   C) the apparent motion of arcs of light caused by gravitational lensing
   D) the motion of galaxies at redshifts z > 1

5. How can astronomers determine the size of an emission region in a very distant and unresolvable source?
   A) by measuring brightness variability, because an object cannot vary more rapidly than the time taken for light to cross the source
   B) by using radio interferometry, because this technique can resolve far greater detail than optical imaging
   C) by measuring the redshift of its spectrum, because this will be dependent upon the source size
   D) by measuring the object's mass and by using a reasonable value for the average density for matter, calculate its volume and hence its diameter

6. What is the Eddington limit for any object?
   A) the mass beyond which the gravitational force on an accretion disk overcomes the rotational motion due to conservation of angular momentum
   B) the speed of light
   C) the maximum pressure that the electrons, nuclei, and photons in the object can withstand before the object collapses into a black hole
   D) the luminosity beyond which the outward force due to radiation pressure on matter exceeds the inward force due to gravity

7. Where do we find supermassive black holes?
   A) only in the centers of giant elliptical galaxies
   B) only in the centers of active galaxies
   C) in the centers of both active and normal galaxies, but only those at relatively high z values, indicating that they existed in the distant past
   D) in the centers of both active and normal galaxies, both nearby and far away

8. Why are there no nearby (and thus "young") quasars?
   A) Eventually, most of the accretion disk falls into the black hole and the "central engine" runs out of fuel.
   B) The central black hole eventually consumes the entire galaxy, and with no more matter in the vicinity, it becomes dormant until another galaxy happens to pass nearby.
   C) The continual infall of material causes the mass of the black hole to grow until it explodes, resulting in a supernova.
   D) The immense radiation output from the quasar carries away energy. The mass of the black hole gets smaller until it evaporates.