Practice Exam 3

1. The dark energy was discovered using ______ as standard candles.
   (a) spectroscopic parallax
   (b) Cepheid Variables
   (c) Type Ia Supernovae
   (d) H II regions
   (e) Galaxies

2. The Cosmic Background Radiation:
   I. Was discovered by Penzias and Wilson at Bell Labs
   II. Was emitted at a redshift of z=1100
   III. Is nearly a perfect blackbody
   (a) I
   (b) I and II
   (c) I and III
   (d) I, II, and III

3. Why are hot stars better than cool stars at forming H II regions?
   (a) cool stars are surrounded by dust, rather than gas
   (b) hot stars are more massive
   (c) cool stars are too old
   (d) hot stars emit more ultraviolet radiation

4. The dust in our Galaxy makes stars seen through it appear
   (a) too faint and too red
   (b) too faint and too blue
   (c) too bright and too red
   (d) too bright and too blue

5. The red light coming from an H II region is produced by
   (a) the scattering of continuous light coming from a nearby star
   (b) interstellar reddening
   (c) spectral lines at 6563 Å emitted by excited H atoms
   (d) spectral lines of H redshifted to very high velocities

6. Rotation curves of galaxies show us that
   (a) Galaxies do not rotate like solid bodies
   (b) They flatten at large radii
   (c) There must be some unseen matter at large radii
   (d) They are evidence for Dark Matter
   (e) All of the above
7. Our solar system is located in the of _____ a _____ galaxy.
(a) halo - elliptical
(b) nucleus - spiral
(c) disk - spiral
(d) disk - elliptical

8. A star cluster with a main sequence turn-off at spectral type A2 is a star cluster with its turn-off at G2
(a) younger than
(b) older than
(c) the same age as
(d) more distant than

9. Which of these types of objects is NOT found in the halo of our galaxy?
(a) globular clusters
(b) main sequence M stars
(c) H II regions
(d) dark matter

10. Our Galaxy is most like which of the following
(a) the Andromeda galaxy
(b) M82
(c) the Large Magellanic cloud
(d) M87

11. Which kind of galaxy is least likely to contain H II regions?
(a) spiral
(b) barred spiral
(c) elliptical
(d) irregular

12. An SBa galaxy would be characterized by
(a) a very small nucleus
(b) a bar through the nucleus
(c) loosely wound (or open) spiral arms
(d) having only old stars and no gas or dust in it

13. Elliptical E7 galaxies appear to look like
(a) basket balls
(b) cigars
(c) golden retrievers
(d) eggs
14. Which of the following is not a radio galaxy?
(a) Cygnus A
(b) Large Magellanic Cloud
(c) Centaurus A
(d) M87 (Virgo A)

15. Which of these do we NOT expect to occur when two galaxies collide?
(a) they will pass through one another
(b) their shapes will become distorted
(c) many stars will collide and explode
(d) there will be much star formation

16. Radio emission from quasars and radio galaxies is generally produced by
(a) hot glowing gas
(b) electrons spiraling in a magnetic field
(c) supernovae
(d) electron-proton annihilation

17. Why must some quasars be small?
(a) they are very bright
(b) they are radio sources
(c) they vary rapidly in brightness
(d) they have large redshifts

18. The redshift of a quasar's spectrum is caused by
(a) the Doppler effect
(b) large gravities and a gravitational redshift
(c) synchrotron emission
(d) special relativity

19. Observations of a quasar called Sooner indicate a spectral line shift with a
redshift, or $Z$, of 2. This means that Sooner
(a) is moving at a velocity equal to the speed of light
(b) is moving at a velocity typical of galaxies near the Milky Way, like the
Andromeda galaxy
(c) is moving at a velocity of approximately 200% the speed of light
(d) is moving at a velocity that is close to, but less than, the speed of light
(e) emitted the light when the Universe was $\frac{1}{2}$ of its current size

20. The main difficulty in understanding quasars is that
(a) their spectra are blueshifted whereas we would expect them to be redshifted
(b) they emit large quantities of energy from small volumes of space
(c) they appear to be receding at velocities faster than the speed of light
(d) none have yet been detected with radio telescopes
21. Seyfert galaxies
(a) are a special type of irregular galaxy
(b) are traveling toward us at high speed
(c) have small bright nuclei
(d) result from collisions of galaxies

22. If a spaceship approaches you at a constant velocity of 90% of the speed of light, you would see its clocks running (compared with yours)
(a) backwards
(b) fast
(c) the same
(d) slow

23. The observational evidence that the Universe is flat (or very nearly so) is based on:
(a) measuring the distance to Type Ia supernovae
(b) measuring the cosmic background radiation
(c) The cosmological principle
(d) the general theory of relativity

24. According to special relativity, two observers in uniform relative motion will NOT disagree on
(a) the mass of an object
(b) the distance (or length) between two objects
(c) the time interval between two events
(d) the speed of light

25. The Local Group is
(a) the part of the universe which can be observed by the largest telescopes on earth
(b) a cluster of stars in the local vicinity, to which the sun belongs
(c) one of the band’s that I play at the beginning of class
(d) a collection of about 2 dozen galaxies, to which our galaxy belongs

26. According to the theory of special relativity, it is not possible to
(a) travel faster than the speed of light
(b) have curved space
(c) have black holes
(d) see the center of our galaxy

27. The primordial background radiation
(a) is coming mainly from distant galaxies and quasars
(b) comes mainly from the direction of the Milky Way
(c) is equally strong in all directions in the sky
(d) is strongest at visible wavelengths
28. According to the big bang model, when did galaxies first form?
(a) during the first seconds after the big bang
(b) when the universe reached a temperature of 3 K
(c) after hundreds of thousands of years
(d) during the heavy particle era

29. The universe is (expanding, contracting) and the galaxies farthest from us appear to be traveling (fastest, slowest)
(a) expanding, fastest
(b) contracting, fastest
(c) expanding, slowest
(d) contracting, slowest

30. The age of the universe is estimated to be
(a) 4.6 billion years
(b) 10 million years
(c) 14 billion years
(d) infinite

31. If the density of matter in the universe exactly equals the critical density (as current observations and theory seem to suggest), then the universe is
(a) open
(b) closed
(c) flat
(d) static and unchanging

32. Olbers’ paradox
(a) has something to do with quasars
(b) has something to do with time variability of the light from Seyfert galaxies
(c) has something to do with the night sky being dark
(d) well, there is this story about two dox . . .

33. Which would you NOT expect to be produced by the big bang?
(a) radiation
(b) helium
(c) carbon
(d) hydrogen

34. According to the big bang model, when did helium first form?
(a) during the first micro second after the big bang
(b) when the universe reached a temperature of 3 K
(c) after (approximately) hundreds of thousands of years
(d) during the radiation era
35. Our Galaxy has a lower total luminosity than
(a) a globular cluster
(b) most irregular galaxies
(c) either of the (Large or Small) Magellanic clouds
(d) a quasar