Astronomy II (ASTR-1020) — Homework 5

Due: 28 April 2009

The answers of this multiple choice homework are to be indicated on a Scantron sheet (either Form # 822 N-E or Ref # ABF-882) which you are to buy at the bookstore. **Remember to use a No. 2 pencil on these Scantron sheets**. Don't forget to write your name and the **Homework No.** (*e.g.*, 5) on the Scantron sheet. You are to turn in this Scantron at the beginning of class on the date indicated above. There are 20 questions on this homework assignment.

Useful Constants

G	$=$	6.673×10^{-11} m^3/s^2/kg	g	$=$	9.80 m/s^2
c	$=$	3.00×10^5 km/s	h	$=$	6.626×10^{-34} J s
k	$=$	1.38×10^{-23} J/K	$H_\circ$	$=$	50 km/sec/Mpc
M_{moon}	$=$	7.35×10^{22} kg	$M_\odot$	$=$	1.99×10^{30} kg
$M_\oplus$	$=$	5.98×10^{24} kg	$R_\oplus$	$=$	6.38×10^6 m
$R_\odot$	$=$	6.96×10^8 m	$T_\odot$	$=$	5800 K
1 AU	$=$	1.50×10^{11} m	$L_\odot$	$=$	3.90×10^{26} W
e	$=$	1.60×10^{-19} C	σ	$=$	5.67×10^{-8} W/m^2/K^4
m_e	$=$	9.11×10^{31} kg	m_p	$=$	1.67×10^{-27} kg
1 ly	$=$	9.46×10^{15} m	1 pc	$=$	3.09×10^{16} m
1 km	$=$	10^3 m	1 hr	$=$	3600 s
1 mi	$=$	5280 ft	1 mi	$=$	1.609 km
1 day	$=$	24 hrs	1 yr	$=$	365.24 days
1 Å	$=$	10^{-10} m	1 nm	$=$	10^{-9} m

1. Which of the following is considered a poor cluster?

a) Virgo Cluster   b) Hercules Cluster   c) Local Group

d) T Tauri Group   e) Ursa Major Group

2. The fact that the rotation curve stays relatively flat beyond the position of the Sun whereas the number of stars falls off in this region tells us what about the Milky Way Galaxy?

   a) The Andromeda galaxy is going to collide with the Milky Way.

   b) The Milky Way is a member of the Local Group of galaxies.

   c) The mass of the Milky Way is $6 \times 10^{11} M_\odot$.

   d) There is dark matter in the outskirts of the Galaxy.

   e) There are a lot of O star in the Milky Way's halo

3. Which of the follow would be consider a type of active galaxy?

a) spiral   b) barred spiral   c) elliptical

d) lenticular   e) quasar

4. Which of the following is used as a distance indicator for external galaxies?

a) white dwarfs   b) neutron stars   c) Tully-Fisher relation

d) Mira variables   e) giant molecular clouds

5. What is the current temperature of the Universe?

a) 98.5° F   b) 0 K   c) 100° C   d) 2.7 K   e) 5770 K

6. The cosmological constant is often associated with which of the following?

a) dark matter   b) dark energy   c) baryon density

d) neutrino density   e) photon density

7. When deuterium was forming right after the Big Bang, it quickly dissociated due to the high temperatures which prevented little helium from forming since deuterium is needed to make helium. When the temperatures cooled enough for the dissociation of deuterium to cease, helium formed immediately. However, the Universe was now too cool to produce any heavier elements. This characteristics is known as the

a) deuterium bottleneck   b) helium flash   c) carbon detonation

d) thermal pulse   e) none of these

8. The reciprocal of the Hubble constant tells us what?

a) The diameter of the Galaxy.

b) The mass of the Galaxy.

c) The diameter of the Universe.

d) The age of the Universe.

e) The density of dark matter.

9. The region around a star where liquid water can exist on a planet is called the

a) water hole   b) hydrogen hole   c) habital zone

d) LGM   e) Miller zone

10. The fact that life on Earth is based upon carbon means that extraterrestrial life will likely only exist on planets in orbit about

a) Pop I stars   b) Pop II stars   c) Pop III stars

d) brown dwarfs   e) white dwarfs

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11. Time of flight can be determined by $t = d/v$, where d is the distance traveled and v is the spacecraft's velocity. The distance to Alpha Centauri is 4.3 light years (ly), where $1 \text{ ly} = 9.46 \times 10^{12}$ km. If the Voyager spacecraft is traveling at 15 km/s, how many years would it take Voyager to get to Alpha Centauri assuming a straight line path? Note that there are 3.16×10^7 seconds per year.

a) 4.3   b) 1200   c) 86,000   d) 140,000   e) 520,000

12. Other than Earth, which of the following objects in the Solar System can possibly sustain life?

a) Earth's Moon   b) Pluto   c) Mercury   d) Europa   e) Venus

13. What is the name of the equation that estimates the number of technological civilizations in the Galaxy?

a) Chandrasehkar's   b) Einstein's   c) Kepler's

d) Miller's   e) Drake's

14. What is the name of the experiment that showed that the building blocks of life (*i.e.*, organic molecules) can naturally form out of simple inorganic molecules?

a) Chandrasehkar's   b) Einstein's   c) Kepler's

d) Miller's   e) Drake's

15. What is the name of the theory that demonstrates that the strong, weak, and electromagnetic forces act as one under high temperatures?

a) Electroweak   b) Grand Unified   c) General Relativity

d) Special Relativity   e) Evolution

16. The least massive elementary particles are called

a) bosons   b) hadrons   c) baryons   d) photons   e) leptons

17. Which of the following is <u>not</u> a field particle?

a) graviton   b) electron   c) photon   d) gluon   e) weakon

18. A non-zero cosmological constant can cause the expansion of the Universe to

a) accelerate   b) remain static   c) be constant

d) oscillate   e) none of these

19. Observations current show us that the curvature of space is

a) positive   b) negative   c) flat   d) spherical   e) hyperbolic

20. Spiral galaxies with unusually bright tiny nuclei are called

a) blazars   b) phasars   c) Seyferts   d) quasars   e) quarks