Astronomy II (ASTR-1020) — Homework 4

Due: 2 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.*, 2) 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
$M_{\rm moon}$	=	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. What is Geminga?

a) A pulsar with a high proper motion.

b) The name of the white dwarf in orbit about Sirius.

c) The nearest *stellar* black hole candidate.

d) The brightest star in the constellation of Gemini.

e) The name of the robot in the movie *The Day the Earth Stood Still*.

2. What is the maximum mass of a neutron star?

a) 10 $M_\odot$ b) 3.0 $M_\odot$ c) 0.4 $M_\odot$ d) 1.4 $M_\odot$ e) 50 $M_\odot$

3. Currently the Sun is in which spiral arm?

a) Perseus b) Cygnus c) Sagittarius d) Orion e) Pegasus

4. Supernovae <u>with</u> hydrogen Balmer lines seen in their spectra results from what process?

a) Gradual mass transfer onto a white dwarf.

b) The iron-core bounce of a massive star.

c) Rapid mass transfer onto a white dwarf.

d) Gradual mass transfer onto a neutron star.

e) A run away He-flash.

5. Of the following sample, which would be considered the *youngest* stellar type?

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

d) Disk Population stars e) all have the same age

6. How was the Sun's location in the Galaxy determined?

a) Distribution of galactic star clusters in the Galaxy.

b) Period-luminosity relation of Mira variables.

c) Through the spiral density wave theory.

d) Period-luminosity relation of Cepheid variables.

e) Distribution of globular star clusters in the Galaxy.

7. Which of the following is <u>not</u> a spiral tracer?

a) H II regions b) OB associations c) neutral hydrogen gas

d) white dwarfs e) all of these are tracers

8. Which of the following describe the Pauli Exclusion Principle?

a) Particles with the same charge will repel each other.

b) Particles with the opposite charge will repel each other.

c) No two electrons can share the same quantum state at the same time in the same location.

d) Like Rudolf, let's exclude Pauli from our reindeer games.

e) Singularities have infinite density.

9. A black hole is an object that has collapsed down to a

a) white dwarf b) quark star c) Herbig-Haro object

d) neutron star e) singularity

10. The <u>best</u> *stellar* black hole candidate yet observed is

a) V404 Cyg b) LMC X-3 c) Cyg X-1

d) SMC X-1 e) SS 433

11. Which one of the following items below is not necessarily a characteristic of an observable black hole candidate?

a) The candidate must be close enough for a trigonometric parallax to be obtained.

b) The unseen companion in a binary star system must have a mass greater than $3M_{\odot}$.

c) It must be an unseen companion in a binary star system.

d) The black hole must have an accretion disk around it.

e) There must be a rapidly fluctuating X-ray signal from a binary star system.

12. Which of the following is not true of the galactic halo?

a) There is almost no ISM there.

b) Stellar orbits are highly elliptical.

c) Its shape is spherical.

d) Globular clusters are found there.

e) It is composed of Population I stars.

13. The radius of the event horizon around a black hole is named after

a) Schwarzschild b) Galileo c) Einstein

d) Newton e) Chandrasehkar

14. Rapidly spinning neutron stars with intense magnetic field are called

a) white dwarfs b) pulsars c) X-ray bursters

d) black holes e) drunks

15. A Cepheid variable with a low metal abundance is referred to as a(n)

a) Type I Cepheid b) T Tauri star c) W Virginis star

d) north star e) classical Cepheid

16. What happens to stars that ignite carbon in a degenerate core?

a) They go through a helium flash.

b) They become completely disrupted through a supernova explosion.

c) They collapse to a carbon-rich white dwarf.

d) They get drunk at the local bar and follow a random walk back to their home like a photon trying to escape the interior of a star.

e) They collapse to a black hole.

17. Stars can pulsate due to changes in opacity resulting from an ionization zone sitting just beneath the photosphere of a stars. For these stars, we say that the star pulsates from the

a) ionization effect b) Doppler effect c) alpha effect

d) kappa effect e) opacity effect

18. Another name for a long period variable star is a

a) RR Lyrae star b) Type II Cepheid c) Mira-type variable

d) eclipsing binary star e) Type I Cepheid

19. If we have a binary star system where both components have filled their Roche lobes, what type of binary system is this?

a) detached binary b) contact binary c) semidetached binary

d) eclipsing binary e) Lagrangian binary

20. Stars that have $M > 8M_{\odot}$ are/will

a) go through a helium flash.

b) supernova via carbon detonation.

c) be completely convective their entire lives.

d) not massive enough to support nuclear fusion.

e) supernova via an iron-core bounce.