29:50 Stars, Galaxies, and the Universe
Instructor: Spangler
Homework Assignment # 7
October 19, 2010

Note: Corresponding quiz on ICON must be completed by 8AM, Monday, October 25

1. What is the radius of the binary companion to Sirius (Sirius B)?
   (a) about 340 Earth radii
   (b) about 12 Earth radii
   (c) about 0.25 solar radii radii
   (d) about 0.90 Earth radii
   (e) about 0.01 Earth radii

2. What is the **diameter** of the binary companion to Sirius (Sirius B)?
   (a) 850,000 miles
   (b) 7100 miles
   (c) 2000 miles
   (d) 10 miles
   (e) 0.5 miles

3. What kind of star is the binary companion to Sirius (Sirius B)?
   (a) white dwarf
   (b) neutron star
   (c) spectral class A main sequence star
   (d) spectral class K giant
   (e) red dwarf star

4. Today is October 19. Approximately what time of day (or night) will you see Sirius near the meridian?
   (a) 8 PM
   (b) 11 PM
   (c) 6 AM
   (d) 11 AM
   (e) 1 AM

5. Consider a star with the following properties. The photospheric temperature is 3000K, the absolute magnitude is -5, and its mass is 20 solar masses. What kind of star is it?
   (a) white dwarf

(b) red supergiant
(c) red dwarf
(d) spectral class G main sequence star
(e) neutron star

6. Consider a star with the following properties. The photospheric temperature is 3000K, the absolute magnitude is -5, and its mass is 20 solar masses. How will this star end up? In other words, what kind of object will be the end product of its stellar evolution? This star will eventually produce a
(a) white dwarf
(b) red supergiant
(c) red dwarf
(d) spectral class G main sequence star
(e) neutron star

7. A supernova has an absolute magnitude of about -17 at peak brightness. Assume a supernova occurs 1000 parsecs from us (this is approximately like the supernova that produced the Cygnus Loop about 5000-6000 years ago, although that supernova was about a factor of 2 closer). What would be the apparent magnitude of this supernova here on Earth? **Hint:** the easiest way to do this is by applying the right equation, although it can be done without such a calculation. When you have your result, think about what it means in terms of other objects in the night sky, many of which you have seen.
(a) -7
(b) -17
(c) -26
(d) 0.5
(e) 27

8. What is the "Chandrasekhar Limit"?
(a) the maximum possible mass of a neutron star
(b) the fastest speed that an object can travel
(c) the maximum possible mass of a white dwarf star
(d) the upper limit to the mass of a Main Sequence star
(e) a limit to the size of a star before it blends with interstellar space