Astro 130, Fall 2016, Homework on Chapter 18
Name: _____ Date: _____

1. In some binary star systems, such as Algol, the less massive star is a red giant and the more massive star is on the main sequence. This is evidence that
   A) mass transfer has occurred from one star to another.
   B) the more massive star formed later, from a disk of gas surrounding the less massive star.
   C) the more massive star captured the other one into orbit some time after the two stars had formed.
   D) stars evolve differently in binary star systems, with less massive stars evolving faster than more massive stars.

2. At which phase of its evolutionary life is a white dwarf star?
   A) very late for a small mass star, the dying phase
   B) just at the main-sequence phase
   C) early phase, soon after formation
   D) post-supernova phase, the remnant of the explosion

3. A Type II supernova is the
   A) explosion of a single massive star after silicon burning has produced a core of iron nuclei.
   B) explosion of a red giant star as a result of the helium flash in the core.
   C) collapse of a blue supergiant star to form a black hole.
   D) explosion of a white dwarf in a binary star system after mass has been transferred to it from its companion.

4. A pulsar is most probably formed
   A) in the core of a star as it evolves through its main sequence phase.
   B) in the center of a supernova explosion.
   C) within a huge gas cloud, by collisions between stars.
   D) just after the formation of a protostar by gravitational condensation.

5. The pulsation periods of most pulsars are in the range
   A) of 1/1000 second and a few seconds.
   B) of 10^{-6} and 10^{-3} second.
   C) from minutes to hours.
   D) from many hours to a few days.

6. A neutron star will be detected from Earth as a pulsar by its regular radio pulses *only* if the Earth lies
   A) in the plane of the neutron star's magnetic equator, halfway between its magnetic poles.
   B) almost directly in line with the magnetic axis of the neutron star at some time during the star's rotation.
   C) directly above the rotation axis of the rotating neutron star.
   D) in the neutron star's "equator," the plane perpendicular to its spin axis.

7. The very strong magnetic field of a neutron star is created by
   A) a burst of neutrinos produced by the supernova explosion, because this would be the equivalent of a very large electrical current flowing for a short time.
   B) the collapse of a star, which significantly intensifies the original weak magnetic field of the star.
   C) differential rotation of the neutron star, its equator rotating faster than the poles, similar to sunspot formation.
   D) turbulence generated in electrical plasmas during the collapse of a star, even though this star had no magnetic field originally.

8. The fastest pulsars, called millisecond pulsars, have periods of about 1/1000 second. The reason they pulse so much faster than (for example) the Crab and Vela pulsars is that they
   A) were formed from much more massive stars than were the Crab and Vela pulsars, and were spun up more as their cores collapsed to a smaller volume.
   B) are normal pulsars, whereas the Crab and Vela pulsars have been slowed down from millisecond speeds over their long lifetimes.
   C) are a totally different phenomenon, involving a black hole rather than a neutron star.
   D) were spun up by mass transferred on to them from a companion in a binary star system.

9. A nova is a sudden brightening of a star that occurs when
   A) material from a companion star is transferred onto the surface of a white dwarf in a binary system and is subsequently blasted into space by a runaway thermonuclear explosion, leaving the white dwarf intact to repeat the process.
   B) the electron-degenerate iron core of a massive star collapses after its mass becomes larger than the Chandrasekhar mass limit.
   C) material from a companion star is transferred onto a neutron star in a binary system, causing the neutron star to collapse into a black hole.
   D) material from a companion star is transferred onto the surface of a white dwarf star in a binary system, after which runaway carbon fusion reactions cause the entire white dwarf to be destroyed in an explosion.