Assignment 8

Remember to number your answers 1a. 1b., etc. so I know which questions you're answering. Be sure to show your work and reasoning for full credit.

1. *(5 points) "I watched the meteor shower yesterday. I hope the Big Dipper isn't the next one to go, that's my favorite constellation!" your friend confides in you. Correct his response.*

2. *(35 points) We discussed the formation of the solar system form the nebular cloud.*

   (a) *(15 points) Summarize in your own words the formation of the solar system from the solar nebula to the present solar system. Include terms like nebular cloud, accretion, protoplanet, protostar, and planetesimal.*

   (b) *(5 points) Why are the planets of the outer solar system so much larger than those of the inner solar system?*

   (c) *(5 points) How is our solar system different than typical stellar systems?*

   (d) *(5 points) What are "hot Jupiters", and how do they come to be?*

   (e) *(5 points) When did the solar system start forming?*

3. *(15 points) Using the magnitudes of Venus (-4.4) and the Sun (-26.8), how much brighter is the Sun than Venus?*

4. *(10 points) A star is observed through a telescope behind a filter. Through a UV-filter, it measures a magnitude of 20. Through a blue filter, 25, and through a yellow filter, 18 (all in arbitrary units). What is the star's B-V color index?*

5. *(18 points) Name and briefly describe the three types of binary stars, what information can be found from each, and the method through which this information is found.*

6. *(20 points) In nuclear physics we use the notation ${}^{A}_{Z}U$, where U is the the element (uranium in this case), A the combined number of neutrons and protons, and Z the number of protons alone. Deuterium (${}^{2}_{1}H$) fuses with with tritium (${}^{3}_{2}H$) to create Helium (${}^{4}_{2}He$). The mass of deuterium is 2 u, tritium 3 u, and helium 4 u. How much energy is released in this reaction, in Joules? Use the conversion 1 u = 1.66×10^{-27} kg, and the definition 1 J=1 $\frac{kg\ m^2}{s^2}$.*