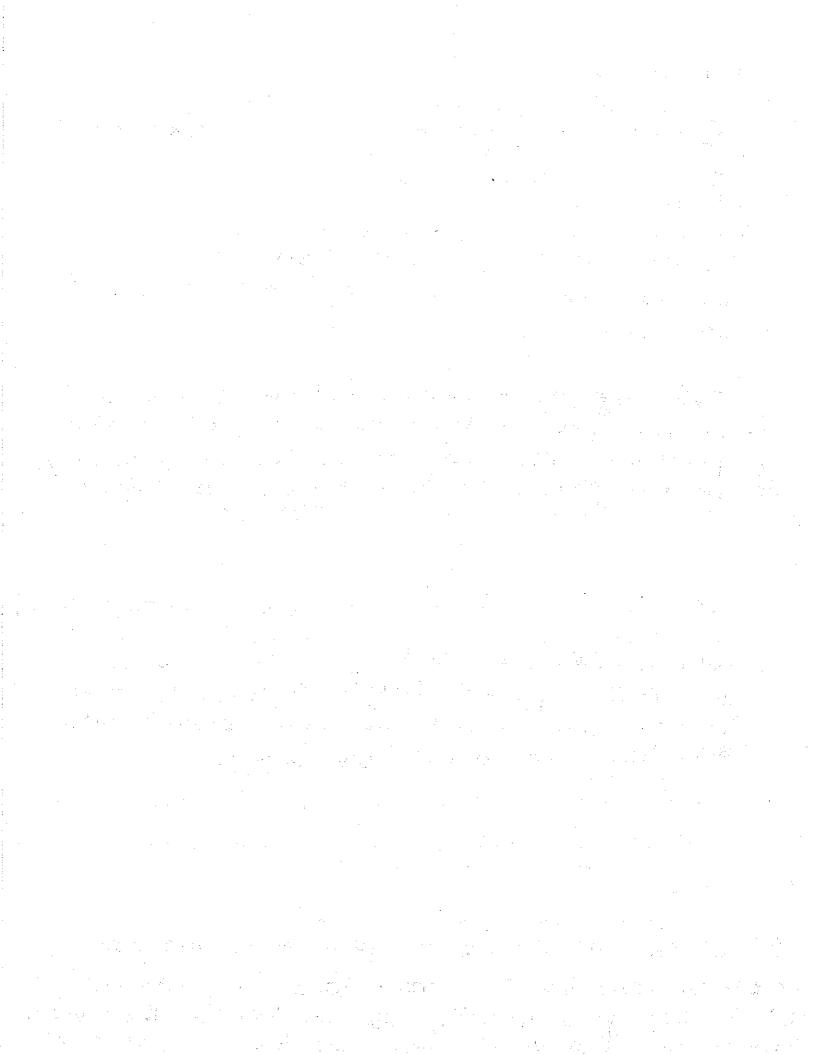
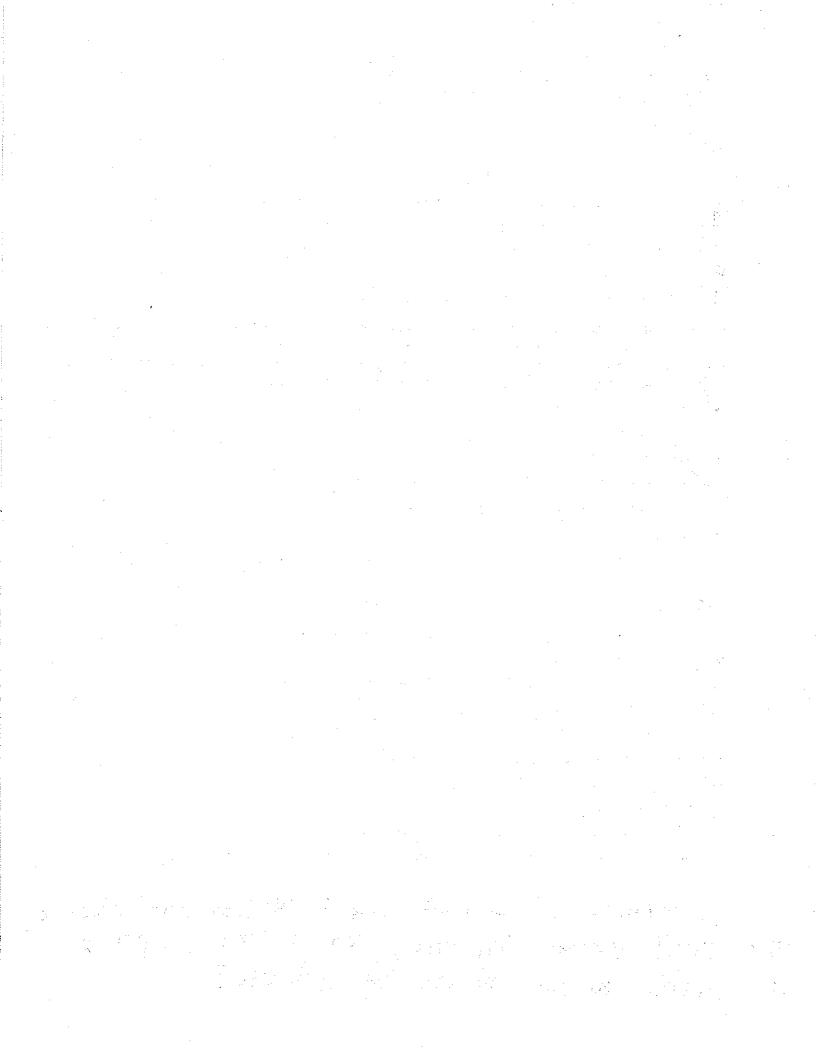
AY4 Homework #4, Sprint 2008

1. Label each of the following statements about the solar wind true or false. The solar wind is composed of energetic photons - x-rays and gamma rays (protons & electrons) The Earth's surface is protected from the solar wind by the Earth's magnetic field
The northern and southern lights are due to the solar wind The solar wind is made mostly of neutrinos
2. How is the solar cycle connected to the number of sunspots observed? When we are at solar maximum, we
observe an increase in sunspots compared to
Solar minimum
3. What is the Solar Neutrino Problem? The measured number of neutrinos is about a factor of number is predicted to be produced by
the pp-chain. This points to an lack of knowledge of neutrino physics, not to a lack of solar physics 4. What is the equilibrium in a collapsing protostar? Knowledge.
Gravity balanced by thermal pressureelectrical attraction forces between the electrons and protons.
Nuclear fusion balanced against gas pressure. There is no hydrostatic equilibrium established for protostars. (this is my they collapse)
5. Why is there a lower limit of around $0.08M_{\odot}$ to the mass of main-sequence stars? Below $0.08M_{\odot}$ tve (enter of the protostor $w.n$) Never get not evough for fusion to start.
Will never get not enough for fision to start. Therefore, these objects will vever become actal
Stars. These are called Brown Dwarf. 6. Where is the site of star formation?
Only in the most distant parts of the Galactic halo where temperatures are cold enough for gas clouds to collapse.
In the outer parts of the solar system where it is cold enough for gas clouds to collapseIn gas clouds where electron degeneracy is the pressure sourceNone of these is correct.
7. Why is a high temperature required for Hydrogen fusion? Dulant 10000 to 00000000000000000000000000000
Protons need to overcome the repulsive electromagnetic
force to bind viz the strong force. They can only do this if they get sufficiently close together, i.e. their velocity need to be high which means the temp must be high.



It will be producing more energy than it does It will have a larger radius than it does now it will have a higher mass than it has now it will have a higher core temperature than it	of the following statements will be true, which false?
Core contraction plus Hydrogen fusion in a shared Core contraction plus electron degneracy. 9. When the Sun becomes a Red Giant which it will be producing more energy than it does it will have a larger radius than it does now it will have a higher mass than it has now it will have a higher core temperature than it	of the following statements will be true, which false?
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	has now
years ago in a single burst of star formation but assume for now that it is). Which of the an elliptical galaxy (answer True) and which	made up of stars which were all formed about 12 billion (note that this may or may not be the correct story ne following objects would you expect to be present in the would you not expect to present (answer False)?
<u>V</u> red giants	
blue main-sequence stars	
planetary nebulae	
Now-mass main sequence stars	
11. The Sun will eventually go through which	of the following phases?
white dwarf	
✓red giant branch	
nova	
✓horizontal branch	
12. Which of the following statements about V	
They were once the core of an asymptotic gia	
They are supported against gravity by e ⁻ deg	
They are steadily cooling off as they radiate e	nergy
They are all at least $1.4 M_{\odot}$	
13. What is the equilibrium in a white dwarf?	
✓ Gravity balanced by electron degeneracy pres	sure.
Gravity balanced by thermal pressure.	·
Electrical attraction forces between the electr	
There is no hydrostatic equilibrium establishe	ed for white dwarfs.
14. What is the Chandrasekar limit? Mc+ = 1.4M0: If a white	duant (He, (stancore) exceeds
this limit, electron degeneral The collapse has the to go	y can no longer support
Its collapse has due to give	NAM => NONSEX



15. Review. Star A and Star B have the same trigonometric parallax and the apparent brightness of A is four times that of B. (Assume no dust toward either star) a) What are their relative distances

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$$PA = PB \quad 8 \quad d \propto \frac{1}{P} \quad \Rightarrow \quad PA = \frac{dB}{dK} = 1$$

b) what are their relative luminosities?
$$L=4 \times D^2 \cdot F \implies LA = \left(\frac{DA}{DB}\right)^2 \cdot \frac{F_A}{F_B} = \frac{F_A}{F_B}$$

Doppler Shift:
$$\frac{\lambda_{\nu} - \lambda_0}{\lambda_0} = \frac{\text{velocity}}{c}$$

Wien's Law:
$$\lambda(\max) = \frac{0.29}{\text{Temp}}$$

- 16. Review Suppose you take a spectrum of a distant galaxy that is moving toward the Earth at 5000 km/sec. You see the hydrogen emission line corresponding to an electron dropping from the second excited level to the first excited level. The "rest" wavelength of this photon is = 6365 Å.
 - (a) Will the measured emission line be red or blue shifted? since galaxy is moving towards us, the wavelength will be decreasing => Blueshifted

(b) What wavelength will it be measured at (note,
$$c=5 \times 10^5 \text{km/sec}$$
)?

(b) What wavelength will it be measured at (note,
$$c=5 \times 10^{\circ} \text{km/sec}$$
)?

$$\frac{\lambda_{obs} - \lambda_{vest}}{\lambda_{vest}} \Rightarrow \lambda_{obs} = \left(\frac{\lambda_{obs}}{\lambda_{vest}}\right) \lambda_{vest} + \lambda_{vest}$$

$$= \lambda_{obs} = \frac{5000 \text{ km/s}}{5 \times 10^{5} \text{ km/s}} \approx 6365 \text{ A} + 6365 \text{ A}$$

$$= \lambda_{obs} = 6429 \text{ A}$$

