

Name:

ASTRONOMY 1102 - Section 1

Instructor: Juhan Frank

Fall 1999

Homework # 6 due Wed. Nov. 10

Stellar Evolution

1) Sketch on a HR diagram the complete life track or evolutionary track of a star like the sun, starting from protostar and ending as a black dwarf. Refer to Figs. 16.5 and 16.12. Describe and sketch the internal structure of the star at each and every one of the stages from Main Sequence (MS) through white dwarf.

2) Study the planetary nebulae shown in Fig. 16.13. Which of these are likely to be the result of ejection by a single Asymptotic Giant Branch star? What kind of star will be left at the center when the nebula expands and cools?

3) Which stars

- a) burn H to He by the CNO cycle?
- b) experience the Helium flash?
- c) cannot burn beyond C?
- d) burn in multiple shells and produce a Fe core?
- e) produce neutron stars?
- f) produce elements heavier than Fe and when?
- g) die in a core collapse supernova (SN)?
- h) produce a Type I or Carbon detonation SN?
- i) produce black holes?

4) Why is it not possible to tell which stage of nuclear burning is Betelgeuse undergoing at the moment (as seen today)?

5) Why are SN of type I "standard candles"?

6) What is the Algol Paradox and how is it resolved?

7) Why is there a maximum degenerate (electron or neutron) pressure ?

8) What is a nova? How does it differ from a Supernova? How does it differ from an X-ray burst?

9) What is a pulsar?

10) Why are C and O more abundant than N in the Universe?