Name: .....

ASTRONOMY 1102 - Section 1

Instructor: Juhan Frank

Spring 1999

Homework # 7 due Mon. Apr. 5th

Dead Stars: White Dwarfs, Neutron Stars and Black Holes

Please answer the following questions:

1) What are red dwarfs, white dwarfs, brown dwarfs and black dwarfs?

2) Main sequence stars of 5 $M_\odot$, 25 $M_\odot$, and 50 $M_\odot$ produce what kind of "dead star" or compact remnant?

3) Do white dwarfs ever explode? If yes, what do we call such an event?

4) What kind of compact remnants are produced by Type II supernovae?

5) We know of about 600 pulsars in our galaxy. Why do we estimate that the total number of pulsars in the Galaxy is ~10^5? Why do we estimate that the total number of neutron stars in the Galaxy is ~10^9?

6) Millisecond pulsars are very old but spin very fast. How is that possible when most pulsars are seen spinning down?

7) Why is "the" millisecond pulsar so important that its discoverers were awarded the Nobel Prize in Physics in 1993?

8) Why don't we see a supernova remnant around every neutron star?

9) Why was the model of orbiting neutron stars ruled out as an explanation for pulsars?

10) Name the three "classical" tests of General Relativity?

11) Where in the vicinity of a black hole do you see the back of your head if you look 90 degrees away from the center of the black hole?

12) Where is the exit cone 90 degrees? Where does the exit cone vanish?

13) What are "black-hole candidates, and which is currently the "best"?

14) Which three parameters are needed to fully define a black hole?

15) What is the Schwarzshild radius of a 10 $M_\odot$ black hole?