Final Exam 1.05.2021 PHYS241000 普通天文學一 General Astronomy (I)

True/False (40 points, 5 point 1. () The location of a sta	t for each question) ar in the H-R diagram indic	cates its temperature and
intrinsic brightness.	City atoms in a gas clou	id can make it collapse t

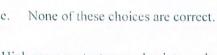
- 2. () The thermal motions of the atoms in a gas cloud can make it collapse to form a protostar.
- () Reflection nebulae look blue because they are reflecting light from a very
- () Hydrostatic equilibrium refers to the balance between weight and pressure.
- (T) Cepheid variables can be used to determine distances because their absolute magnitude can be determined from their period.
- () A star begins fusing hydrogen to helium the moment it leaves the main sequence.
- 7. (T) Theory predicts that neutron stars may not exceed 3 solar masses.
- (T) If the accretion disk around a black hole emits x-rays outside the event horizon, then the x-rays can escape.

Multiple Choice (40 points, 5 point for each question)

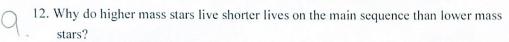
- 9. Star A with surface temperature 10000K is less luminous Star B with surface J=ETA.74= @ 42/277 temperature 3000 K. Why?
 - a. Star A is smaller than Star B.
 - b. Star A is less dense than Star B.
 - c/ Star B is closer to Earth.
 - Star B is farther from Earth.
 - 9, A cool star cannot be more luminous than a hot star.

(What's the right sequence from high to low density?

- The HII intercloud medium, hot coronal gas, HI clouds, and molecular
- The HI clouds, HII intercloud medium, molecular clouds, and hot coronal b. gas.
- The molecular clouds, HI clouds, HII intercloud medium, and hot coronal
- The hot coronal gas, HII intercloud medium, HI clouds, and molecular clouds.



- 11. High-mass protostars evolve into main-sequence stars:
 - more slowly than low-mass protostars because their stronger gravity slows their collapse.
 - more slowly than low-mass protostars because their higher core temperature slows their collapse.
 - more quickly than low-mass protostars because their stronger gravity speeds up their collapse.
 - d. more quickly than low-mass protostars because their higher core temperature speeds up their collapse.
 - e. at the same rate as low-mass protostars.



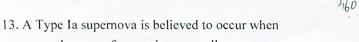
- a. Higher mass stars burn through their nuclear fuel faster.
- b. Lower mass stars don't get their energy from that same nuclear fusion source as higher mass stars.

Higher mass stars have less hydrogen fuel to burn. E

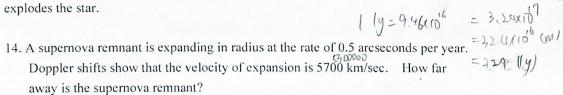
- d. Lower mass stars spend a longer time evolving to the main-sequence.
- e. All of the above are false.

the main-sequence.

$$\frac{1080}{216}$$
 $\frac{1080}{314}$
 $\frac{276.}{3140}$



- the core of a massive star collapses.
- the cores of massive stars expands.
- carbon fusion occurs. C.
- on tano = 1/2U / pc = 1/AU x 360060000 a white dwarf exceeds the Chandrasekhar limit.
- neutrinos in a massive star become degenerate and form a shock wave that $= 1.5 \times 10^{11} \times 6^3 \times 10^4$ explodes the star.



- 5700 pc
- 24 pc d.
- 2400 pc

$$\frac{5.7 \times 10^{6} (\text{m/s})}{2.10 \times 10^{-11}} = \frac{5.7 \times 10^{6}}{3.10 \times 10^{-11}} = 2 \times 10^{-11}$$

$$= \frac{1}{12 \times 36 \times 36 \times 00}$$

$$= \frac{1}{2 \times 10^{-11}}$$

$$= \frac{1}{2 \times 5 \times 10^{5}} = \frac{1}{4 \times 10^{6}}$$



(13. The density of a neutron star is

- about the same as that of a white dwarf.
- b. about the same as that of the sun.
- c. about the same as an atomic nucleus.
- d. about the same as a water molecule.
- 2.5 $2.7 \times 1.6 \quad 100 = (2.712)^{5}$ $= 10 \times 0.4 \quad 5100 = 2.712$ $= 4 \quad 512$ 105

16. As material flows into a black hole

- a the material will experience time dilation.
- b/ the material will become longer
- the material will increase in mass.
- a and b
- a, b, and c

Brief Essay (40 points, 10 point for each question)

17. Explain how can we use the H-R diagram to estimate the age of a cluster of stars.

smaller than expected because the magnetic field is so strong.

- 18. Write done the stages the Sun will go through in the future.
- 19. A main sequence star with enough mass will evolve into a giant star. Why the radius of such stars expand?
- 20. The apparent visual magnitude is 0 mag for Vega. Use Fig 1, 2, and 3 to calculate the distance of Vega in the unit of pc.

 $m_V - M_V = -5 + 5 \log_{10}(d [pc])$ Hint: Distance modulus

PHYS241000 普通天文學— General Astronomy (I), Final Exam, Answer Sheet

Name: FAA

1D number: (09022(09)

True/False

1	2	3	4	5	6	7	8	401
1	F	E	7	7	=	7	T	140

Multiple Choice

9	(10)	11	12	13	(14)	15	16
a	e.	C	a	d	9.	C	d

Brief Essay

In a cluster of stars, there are mony different moss stars. The evolving relacition of different mass stars is varieable : high mosses stays evolve into supergiant more Ruickly, low mosser store endile into giart more slowly. So we can use this property to estimate the ose of a cluster of stars.

19. Because the shell outside is keep burning, so the heat pressure keep puch the shell a to expand but the gravity is not strong enough to pull of the corp. the whole shall back. Only the product find a type of star have the same of the burning reaction would fall into the core and make the demity of the core much idenser.

Which shell 7 1

Our Sun is a main sequence star right now, About five billion years later, the hydrogen in the core will be fueled into helium, so the core would collapse but the hydrogen shall will keep fueling and expand into a red stout. Then the density and temperature of core is high enough to fuel helium into corbon, the shell will stort scallege Till the belium is +10 fueled into carbon, the shell will become 20. planeton rubula, and the core will become

a white dwarf.

20. From fig. I we can know that the absorption line of Vega is approximately at 4200, 4400, 4900 and 6600 (\$), 50 obsorption line at tis. 2 which is AI type. Then use H-R diagram to find the absolute magnitude of Al, which is approximately 2, and the visual magnitude is O.

=) 0-2=-5+5lojd logd = } d= 10\$ = 2,312 x 10\$ = 2312x 1.6 410 = 4 (pc) = 13.08 (14) &