

**Name (1pt):**

**Physics 20083 - Spring 2007 Final B**

**Instructions:**

1. Answer 11 of the following 12 questions in the space provided. If you need extra space, please use the back of the page and make an appropriate notation on the front of the page so that I will know where to look for your complete answer.
2. Clearly indicate with a big "X" which question you do not want me to grade. Allow time when you are finished for me to double-check your exam to ensure you have clearly marked a question for omission and that you have answered 11 questions and not accidentally skipped a page. If you do not clearly mark a question out, I will grade the first 11 you answered.
2. Each question is worth a total of 9 points.
3. Each question requires an answer that is typically no more than two or three sentences long or perhaps a diagram and 1-2 sentences. Some questions do not require explanations. This will always be explicitly stated.
4. You may **not** use your own paper, book, notes or a calculator for this exam.
5. You will have 2 hours and 30 minutes to complete the exam and turn it in.

1. Explain the two different possible resolutions of the solar neutrino problem that we explored in class, and briefly state which resolution turned out to be right.

2. Explain why blackbody radiation is called "blackbody" radiation instead of, say, "redbody" or "greybody" radiation.

3. When trying to decide between the geocentric and heliocentric models, astronomers attempted to measure parallax angles for some stars. What are two possible conclusions we can draw from this failure, one supporting the geocentric hypothesis and one supporting the heliocentric hypothesis?

4. If a star has broad spectral lines compared to the Sun, explain how you would determine whether the spectral lines are wide due to temperature or density.

5. Explain why forbidden lines can only occur in low-density regions like the interstellar medium rather than in our laboratories on Earth.

6. Why do stars turn red at the end of the main sequence part of their lives, even though their cores are burning at somewhat hotter temperatures than normal?

7. Explain why AM radio signals travel further at night.

8. The planets in our solar system obey the Keplerian rotation curve. When we measured the rotation velocity of stars in our galaxy around the galactic center, what did we expect to find, assuming no dark matter exists. Would the rotation curve be different from Keplerian? If not, why not? If it would be different, explain how and why. A diagram and/or graph would help on this one.

9. Explain (a) how we use the Tully-Fisher relation to find the distance to edge-on spiral galaxies. Also, (b) explain why this technique is distance-limited.

10. Explain how motions in clusters of galaxies are used as evidence of the existence of dark matter.

11. Explain why it was harder for stars to form during the first billion years in the Universe.

12. According to Hubble's Law, galaxies are receding from our location at speeds proportional to their distances. However, not all galaxies are moving away from us. Explain why some galaxies do not obey Hubble's Law.