

Astronomy 10

Final Exam

1. On the star maps (you get them as separate sheets) indicate the region of the sky which you **can always see** from Helsinki (Finland) and Rio de Janeiro (Brazil)
Coordinates of Rio de Janeiro, Brazil 22°54'30" S 43°11'47" W
 Helsinki, Finland 60°10'15" N 24°56'15" E
2. What are *comets*? How do they differ from asteroids?
3. Briefly explain why sunspots are cooler than surrounding regions of the Sun and why they look dark in photos.
4. Two stars, Betty and Wilma, are both on the main sequence. Betty is more luminous than Wilma. Which one has a hotter surface temperature? Which one is more massive? Which one is bigger? If they both formed at the same time, which one will evolve off the main sequence first?
5. Earth is about 150 million km from the Sun, and the apparent brightness of the Sun in our sky is about 1,300 watts per square meter. Determine the apparent brightness we would measure for the Sun if we were located *five times* Earth's distance from the Sun.
6. What is a *planetary nebula*? What happens to the core of a star after a planetary nebula occurs?
7. Briefly explain why high-mass stars have shorter lifetimes than low-mass stars.
8. Why do spiral arms [in spiral galaxies] have a blue color?
9. Briefly explain how we think quasars produce so much energy.
10. List at least two observational evidences for existing of the *dark matter* in the Universe

These questions are more difficult:

11. If you look at the Solar System from the distance 10 parsec what is the angular size of the Earth's orbit?
12. In 1930, the boundaries between the 88 official constellations were devised so that they are parallel to the lines of right ascension and declination for epoch **B1875.0**. The borders on a modern star map of epoch **J2000** -- see e.g. star map 51 -- are somewhat skewed and no longer perfectly parallel to the coordinate grid. What is the reason?

General Remarks:

- **Please write your name at the top of each page**
- Please write **legible**
- Try to answer as many questions as possible, but please keep in mind that I do not expect that you answer all questions.
- Reasoning matters
- Try to give concise answers, 2-4 sentences.
- If you need to draw a sketch – do it (a picture is worth of thousand words)
- I am interested to know what YOU have learned.