PHYS 182 Fall 2019 Prof. R. Brandenberger

Readings and Homework for Week of Sept. 9 2019

Readings

Textbook, Chapters 1 and 2

Problems (due Sept. 18 in class)

1. In astronomy we measure distances in terms of the time it takes light to travel the corresponding distance. How long in km is a) 1 light second, b) one light minute, c) one light hour, d) one light day?

2. We use radio waves which travel at the speed of light to communicate with robotic spacecraft. How long does it takes signals to arrive to us from a) Mars at its closest (56 million km), b) Mars at its farthest (400 million km), c) Pluto at its average distance of 10^9km.

3. We are located about 27,000 light years from the galactic center and orbit the center about once every 230 million years. How fast are we travelling in km/hr?

4. Explain why we measure only angular size and distances of objects in the sky. What are *arcminutes* and *arcseconds*

5. The sun has an approximate angular diameter of 0.5^o and an average distance from us of about 150 million km. What is the approximate physical diameter?

6. We observe two stars which look alike except that one of them is 16 times brighter than the other. What can you say about the ratio of distances?

7. An observer sees a faint object in the sky. How can he/she tell whether it is a star or a galaxy?

8. In class I discussed how the redshift of the spectrum of a galaxy can be used to determine its distance. Can we use the same method to determine the distance of a star inside our galaxy? Why or why not?

9. An astronomer wishes to measure the orbital period of a distant planet. Tell him/her what observations to make.

10. What are the advantages of observing very distant galaxies from outer space as opposed to from the ground? What are the advantages of observing from the surface of the Earth? If transportation costs were not an issue, then where would you construct your large ground-based telescope? Justify your answers.