

ASTRONOMY 020

Problem Set #5

Due: October 24, 2003

1. The Earth's rotation also produces an aberration of starlight. Calculate the maximum angle of aberration for a star on the celestial equator that is observed from the Earth's equator.
2. Zeilik & Gregory, Chapter 3, problem 3.
3. Zeilik & Gregory, Chapter 3, problem 6, parts (a) and (b) only.
4. Explain the significance of the Arctic Circle and the Tropic of Cancer, insofar as the position of the Sun in the sky at particular times of the year. Furthermore, draw the path of the Sun at summer solstice on a horizon system for each location.
5. If a star is seen to rise at 10 pm one night, when would you expect to see it rise 1 month (30 days) later?
6. Proxima Centauri is observed to have a parallax angle of $0.764''$. What is its distance from the Sun?

Practice problems:

1. Zeilik & Gregory, Chapter 3, problem 12.
Answer: The Moon's new period will be 59.4 days.
2. Zeilik & Gregory, Chapter 3, problem 16.
Answer: $dF_{\text{Moon}}/dF_{\text{Jupiter}} \approx 170,000$, $dF_{\text{Moon}}/dF_{\text{Venus}} \approx 19,000$.
The Moon has a much greater tidal influence than any of the planets.
3. The outermost part of Jupiter's ring system lies at about 128,500 km from Jupiter's center. Show that this is within the Roche limit of Jupiter. Assume that $\rho_M = \rho_m$.
Answer: Using $k = 2.5$, the Roche limit is $d = 178,500$ km.