Problem Set #2
Astro 1
Due October 11, 2019 by 4:30 PM

1. (U10-3.31) (a) The Moon moves noticeably on the celestial sphere over the space of a single night. To show this, calculate how long it takes the Moon to move through an angle equal to its own angular diameter(which we know to be $^1/_2$ of a degree). (b) Through what angle (in degrees) does the Moon move during a 12-hour night? Can you notice an angle of this size?
2. (U10-3.43) (a) Suppose the diameter of the Moon were doubled, but the orbit of the Moon remained the same. Would total solar eclipses be more common, less common, or just as common as they are now? Explain. (b) Suppose the diameter of the Moon were halved, but the orbit of the Moon remained the same. Explain why there would be *no* total solar eclipses.
3. (U10-4.46) The mass of the Moon is 7.35×10^{22} kg, while that of Earth is 5.98×10^{24} kg. The average distance from the center of the Moon to the center of Earth is 384,000 km. What is the size of the gravitational force that the Moon exerts on Earth? How do your answers compare with the force between the Sun and Earth calculated in the text? (This calculation is found in both editions of the text)
4. (U10-4.55) Figure 4-23 in U10 & Figure 4-24 in U11 shows the lunar module *Eagle* in orbit around the Moon after completing the first successful lunar landing in July 1969. (The photograph was taken from the command module *Columbia*, in which the astronauts returned to Earth.) The spacecraft orbited 111 km above the surface of the Moon. Calculate the period of the spacecraft's orbit. See Appendix 3 (in both U10 & U11) for relevant data about the Moon.